Proceeding
International Seminar of Sport and Exercise Science 2014
Surabaya - Indonesia, 21-22 October, 2014

Penyusun:

Desain dan layout:
Ton's - Oky
Katalog Dalam Terbitan (KDT) :
ISBN: 978-602-17477-1-1

Cetakan pertama, November 2014- Diterbitkan

atas kerjasama:

Fakultas Ilmu Keolahragaan Universitas Negeri Surabaya November 2014

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UNDANG-UNDANG REPUBLIK INDONESIA
NOMOR 19 TAHUN 2002
TENTANG HAK CIPTA Pasal 72

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WELCOME

Dear colleagues and friend,

On behalf of the School of Sport Sciences, Surabaya State University, I have the honor to announce Surabaya as host city of the International Seminar of Sport and Exercise Science (ISSES), entitled “Sport and Exercise Science for Sport performance and Health Enhancement. Herewith I welcome academicians and Students of Physical Education and Sport Science from any regions in Indonesia on October 21st and 22nd, 2014. This is the first time the School of Sport Science Surabaya State University organizes an International Seminar, and I hope it will provide great opportunity to promote and develop Sport Science through networking, study, and research.

I hope in the future this kind of event would be under the patronage of the Ministry of Youth and Sport. I would like to express gratitude to the guest speakers of this seminar, namely: Prof Dr Supranee Kwanboonchan from Srinakharinwirot University, Thayland, Prof Dr Lim Boon Hooi from University of Malaya, Malaysia, Prof Dr Koh Koon Teck from Nanyang Technological University, Singapore, Prof Dr Chia Hua Kuo, Dean of Research, Taipei University, Taiwan, and Dr Gregory J Wilson, from The University of Western Australia, Sport Consultant of Indonesian Olympic Committee.

We are confident that you will enjoy the whole conference experience, sharing knowledge and ideas, and eventually make contributions to the advancement of Sport and Exercise Science.

Organizing Committee Chairman,

Prof Dr Soetanto Hartono, DDS, MSc
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REFLECTIVE PRACTICE FOR COACHES & ATHLETES

Abstract
The benefits of reflective practice in promoting self-awareness, improving coaching knowledge and performance have been documented by a number of researchers in sport coaching literature. However, there is a lack of empirical studies on how coaches and athletes can effectively engage in the reflective process simultaneously, facilitated by learning facilitators. The purpose of the present study was to test the efficacy of using game reflection cards with a national basketball team to improve athlete performance and promote coach and athlete reflection. A learning facilitator (i.e. the first author) worked with the team during an entire season in preparation of a major game which was held once every two years in 2013.

He conducted workshops, observations during practices/games and provided feedback to the coach and players. He also interviewed them after the season. Findings indicated that the researcher was able to put in place an initiative that helped the coach integrated reflection practice in their coaching practice. The players have also indicated how they have benefited from this initiative and how it has improved self-awareness and enhanced performance. The Head coach and players also made several suggestions how the training package could be improved. Findings are discussed with reference to high performance sport development and suggestions are offered to professionals working with high performance sport coaches.

Key words: goal-setting; self-awareness, positive self-talk; visualization; reflection; learning

The efficacy of using game reflection-card to a high performance basketball team: The process and perceived outcomes The dynamic nature of elite sport requires coaches to possess professional knowledge (e.g., physical, technical, and tactical) and simultaneously integrate it into a player-internalized training plan that is capable of addressing a variety of contextual situations and perform (Richards, Mascarenhas, & Collins, 2009). In this regard, high performance coaches are required to continually looking for opportunity to learn and develop their craft knowledge in order to remain competitive consistently (Mallett, 2010). One of the ways to development coaching professional is to devote time in continuous coach education (formal learning).

However, there were mixed reactions from some researchers on the low transferability of formal coach education to real-life coaching scenarios (Cushion et al., 2010; Gilbert,
Indeed, informal learning through ‘on-the-job’ training has been identified as alternative learning mode that has the potential to enhance knowledge, skills, and improve performance (Gilbert & Trudel, 2006). Some of these learning situations included: reflection (Gilbert & Trudel, 2001; 2006), working with knowledgeable others (Cassidy, Jones, & Potrac, 2009; Cushion, Armour, & Jones, 2003), and being mentored by experienced coaches (Bloom, Durand-Bush, Schinke, & Samela, 1998; Cushion et al., 2003). However, research on the process of implementing such learning situations remains scarce, especially at the high performance level. Reflection, as an informal learning situation, has been shown to play an important role in enhancing the knowledge of practitioners and creating their own blueprint for success, (Gallimore, Gilbert, & Nater, 2013; Miles, 2011). Indeed, coaches highly value facilitated reflection opportunities and on-going learning mediated by self-reflection (Gallimore et al., 2013) but reflection itself is a complex skill that requires practice in order to reap benefits (Miles, 2011). For coaches to become reflective practitioners, they must become competent at framing their roles and identifying issues in order to subsequently generate, experiment, and evaluate strategies aimed at solving the issues they have encountered and identified. Without a structured reflective process and proper guidance, coaches’ reflective practice may be uncritical and thus have a lower impact on actual coaching strategies (Gilbert & Trudel, 2001, 2006).

The importance of learning facilitators in enhancing coaches’ reflection has been acknowledged by some researchers (Culver, Trudel, & Werthner, 2009; Koh, Mallett, & Wang, 2011). Learning facilitators can be of great value because they can guide coaches in the reflective process by proposing areas for improvement and formulating ideas for change in non-threatening manners (Gilbert & Trudel, 2001, 2006). In order for the reflective process to be productive, both the learning facilitators and coaches must be built upon trust and openness. It is also essential for the learning facilitators to clearly understand their “clients” personal biography and coaching needs (Trudel & Gilbert, 2013) in order to yield benefits. Cropley, Neil, Wilson, and Faull (2011) conducted an intervention over a five-week period with the purpose of nurturing a reflective process to help two soccer coaches deal with their coaching problems. Through engaging in reflective conversations, the coaches’ self-awareness levels improved and they also reported an increased understanding of their players and the coaching environment. However, apart from the Cropley et al. (2011) study, there have been few interventions with learning facilitators aimed at improving the process of reflection in coaches, especially in high performance sport.

In recent years, some researchers have pushed the boundary further by incorporating reflective practice to athletes (individuals and teams) with the aim to empower them to engage with, and contribute to their technical and tactical development to enhance performance (e.g., Faull & Cropley, 2009; Richards et al., 2009).
For example, Faull and Cropley presented a case on integrating reflective practice into the training program of an elite triathlete with the aim to enhance athletic performance. They found that structured reflective practice can help to increase athlete’s self-awareness and evaluative skills. Such approach can promote greater engagement and buying-in of athletes and should be considered as a component for athletes’ development. Apart from these two studies, empirical evidence on integrating and implementing reflective practice approaches with elite athletes remain scarce. A number of researchers have offered practical suggestions on how to structure the reflective process more effectively to yield positive results (e.g., Cropley et al., 2011; Gilbert & Trudel, 2013). For example, Gilbert and Trudel have discussed the possibility of integrating reflection cards, which might be helpful to guide and evaluate reflection systematically, thus promoting coaches’ and athletes’ development. Nonetheless, most of the studies only examined the efficacy of using reflection-card either on coaches or athletes but not on both simultaneously. Therefore, the purpose of this study was to test the efficacy of using game reflection cards with a national basketball team to improve athlete performance and promote coach and athlete reflection at the South East Asian (SEA) Games. Events are chronologically detailed with a focus on the training package which I’ve put together based on my professional knowledge and experiences as a competitive basketball athlete and coach.

Challenges faced and the coaches and players’ points of view were also addressed in this manuscript.

**Method**

**Context**

The current study was conducted within the context of elite sport settings (Lyle, 2002). In Singapore, the demands and expectations for elite sports to deliver results at any international competition are increasingly important to the National Sport Associations (NSAs) and government funding agencies with the view of accountability for public funds (Mallett, 2010). NSAs with good track records such as Shooting, Table Tennis, Bowling and Sailing typically receive more funding from the government (Koh, Mallett, & Wang, 2011). Currently, there are 67 NSAs in Singapore and more than 80% of them qualified for the funding but varied in the amount given. The amount of funding received from the government to the NSAs will have a direct impact on things that they can do and achieve, including performance outcomes.

**Participants**

*The Coaches and Players*

The head coach and players from the senior men’s basketball team were purposefully recruited to participate in this study. The intervention occurred when the team was preparing for the SEA Games in 2013. The participants were one male Head coach
(46 years old) and 12 players ($M_{age} = 21.2$ years, $SD = .42$). The Head coach had accumulated 10 years of coaching experience at the national senior team level. The players reported on average six years of playing experience at the senior national team level. Upon getting the approval from the Head coach and Basketball Association of Singapore (BAS), participants (players and coach) were informed about the purpose of the study and they subsequently voluntarily agreed to participate.

**The Researcher/Learning Facilitator**

The first author was the learning facilitator for the coach in the present study. I was responsible for the project in all the three phases of a competition season: 1) pre-season (e.g., getting approval from Head coach and BAS, initiating discussions with the Head coach, providing reading materials, on-site visit during practices and games), 2) in-season (e.g., on-site visits during friendly games, following the team for selected training tours, writing reports, discussions with the coach), and 3) post-season (e.g., analyzing data, conducting interviews, writing and disseminating findings). My background as a competitive basketball player, an experienced basketball coach and opportunities working in local and international committees allowed me to connect and cordially work closely with the participants (coach and players).

**Procedure**

**Pre-season**

First, I met with the Deputy President of BAS and the Head coach to discuss the rationale of the study and my involvement with the team. They shared with me that the last medal won by Singapore men’s team in the similar competition was 34 years ago. They also mentioned that the senior men’s team has not been doing well in the past nine years, partly due to a lack of sport sciences support as well as lack of high level league to prepare the players for high quality competitions. The team’s performance always falls short from a medal hope (i.e. fourth or fifth position). Nonetheless, they felt that the current squad stood a chance to win a medal in SEA Games 2013 as their standard was comparable to the participating countries.

I shared with them how I could help the coach to gather specific feedback from players using reflection-card; reflect on it systematically and critically with the aim to improve the quality of practice. I also mentioned to him how players can be empowered to
engage with, and contribute to their technical and tactical development and build their mental toughness through reflection. Following the discussions, the coach deemed it beneficial for me to work with him during the season and agreed to participate in the study. With the approval granted from the coach and BAS, I met the players, explained to them the rationale of the study and invited their participation. All of them volunteered to participate in the study.

I conducted the first meeting with the coach to discuss how I could work with him over the course of the upcoming season. He expressed the desire to improve the team’s performance. He was confident that his team had the technical and tactical competencies to compete with their opponents but strongly felt that they need to strengthen the mental aspect. I explained to him how I could help to design a training package that consists of mental skills training (e.g., goal-setting, visualization, positive self-talk) and reflection-card to be used to evaluate the individual and team goals, identified reasons for good/bad performance as well as specific areas for improvement. Some of the targeted components to reflect on included: a) skills (e.g., field goal percentage), b) set-plays, c) physical fitness, and d) mental toughness (team and individual). Participants were asked to reflect and response to each item in the components (yes or no) and consider possible reasons for the responses. For example: “What did you notice in the practice leading-up to this competition/training tour that most likely contributes to today’s results?” “What did you notice from the competition/game that should be addressed in the next practice sessions?” “Who is the player of the week/game and the reasons for nomination?” Question that might be useful to the team such as: “Anything your team manager/coaches should be aware of with regard to the training session/game?” was included to promote open communication among the team members. The Head coach also gave his full support for me to talk and work with his players directly, especially during games to help them stay focused and perform up to their potential.

One week after the meeting, I conducted participant observations (Dewalt & Dewalt, 2011) of two practice sessions. The observations focused on team routines (e.g., team briefing before, during and after practice/game; free throws practices; coach-athlete-interactions) and how the coach promote reflection during coaching practice. Field notes were taken during each observation resulting 16 single-spaced pages of data. Two 70 minutes workshops were conducted after the team practices at BAS conference room.

First workshop was conducted one month after the team started the pre-season training. At the workshop, I provided the coaches and players an overview of
psychological skills training (PST) and reflection framework to illustrate the importance of mental toughness and reflection, as well as how to go about doing it systematically. I also prepared five-page materials on goal-setting, positive self-talk and visualization strategies based on recommendations from scientific literature (e.g., Burton & Weiss, 2009), as well as the reflective practice and reflection-card by Gilbert & Trudel (2013). I shared with the coach and players how I had observed the Head coach use the goal-setting as a strategy to the team and players. First, the goals were decided by the coach and focused on performance climate. Second, there were no individual goals hence no indication of individual progress.

I told the coach the importance of getting players to be involved in the goal-setting process, having goals that promote mastery climate (i.e. personal improvement) and revising goals periodically using reflection-card. The coach and players were guided on how to identify and use measureable outcome goals, as well as strategies to reflect systematically that put the team to be competitive on a consistent basis. They decided to use the games statistics from the National Basketball League just concluded as the baseline data for the players and worked from there. They were aware that negotiable goals between the coach and the players should be reviewed regularly to ensure they are realistic and achievable. It is also a good indicator to check on player’s progress periodically.

I shared with the coach and players how to establish routine for practices and games. For example, time needed and types of specific activities for warm-up; the number of bounces taken before executing the free-throw shots. Players were taught reflection techniques and how they should use it to overcome negative thoughts when they made mistakes. For example, when a bad pass was made, reflect and acknowledge the mistake, and focus on the actions needed (i.e. I can make a good pass. Read the defense and look for open player before making the pass next time. I can do it!).

The second workshop was conducted at the last week of the pre-season phase before the team departed for an oversea training tour. The main focus of this workshop was on how to use the game reflection-card to evaluate the targets set for games and provide feedback to their coach for follow-up actions (see Figure 1). The coach and players were required to check off their achievement targets (yes or no) after each game and reflect on (a) what happened in practices leading up to the event that may have influenced the results of the achievement targets? and b) what they can/will do in the future practices to address deficiencies of their achievement targets? Such reflective practice routine is useful to the coach as he is more aware of his strengths and weaknesses.
while coaching (Gilbert & Trudel, 2013). It is also beneficial to the players as it empowers them to take ownership of their learning and work towards personal improvement. I maintained regular contact (at least once a week) with the coach via email, telephone, or face-to-face interactions to discuss current coaching issues and possible solutions. The regular interactions proved valuable in challenging the coach and helping him formulate appropriate strategies to solve coaching issues.

**In-season**

I followed the team for two training tours as well as the SEA Games. I attended all the training sessions and games (20 practices and 17 games in total). The purpose of the observations was to nurture the reflective process by providing targeted suggestions and recommendations to the coach and players. The specific areas identified by the coach and players from the reflection-card were used to inspire participants to develop strategies for personal and team’s improvement. The materials highlighted served as a source for discussion during regular meetings held between the coach, players and me. Field notes were taken during practices and games. Following each observation, I interacted with the coach to stimulate reflection and provided feedback to him, with the aim of improving his subsequent practice/game. Team debriefs were also held every night in the coach’s hotel room. Players were told to update the reflection-card and submit it to their Head coach for reflection prior to the meetings. The Head coach also shared the reflection-card materials with me after reading. At the debrief session, each player was given time to comment and provide feedback with regards to the game played. This was the time I could observe how the Head coach attempted to reinforce the reflection-card in his practice/game. For example, he highlighted a case when one of his shooters did not perform up to expectation during the first half of the game mainly due to lack of focus. He was asked to reflect what to do (i.e. to forget the mistake made and focus on getting the first timing shot without hesitation so that the shooting habit/routine is not affected). When he was given the opportunity again, his did what was told by his coach and improved the shooting percentage at the end of the game. The same player wrote similar information on the reflection-card (i.e. reasons led to poor shooting percentage) and he was able to pinpoint the error he had made and the required actions to solve the problem.

Another example in relation to gathering feedback from players to improve coaching practice through reflection-card was when the coach implemented a new defensive strategy during morning practice and asked players to execute it in the evening game. As most of the players were unsure about the concept and the coach did not allocate enough time to cover the details, the team performed badly during the game mainly due to poor defensive concept. Most of the players were able to identify this issue and indicated it in the reflection-card. They reflected to the coach to focus and address this problem at the next practice session. The coach noted their feedback and devoted the entire next day training session to work on it and to ensure that everyone was clear about his role and the defensive concept he planned. The team executed the concept very well and won the game.
As this issue was addressed timely and appropriately, it was never surfaced as an issue in the subsequent reflection-card and team debriefs anymore.

In addition, one-to-one interaction between the Head coach, targeted players (identified by the coach) and me was conducted immediately after the team debrief. During the meeting, information contained in the reflection-card was used to guide the discussion between individual player and the coach. For example, one of the key players tended to focus on going for the ball instead of boxing out his opponent first during defense. As a result, the opponent often had better opportunities to collect more offensive rebounds and score second chance points under his basketball. The coach showed him tips and technique on how to address this issue. He also answered questions and doubts from the player on getting the technique right. This was a clear signal of how the coach integrated and reinforced reflection (think about what and why it happened, how to prevent it from happening again) to his player. The player improved tremendously and was ranked among one of the top defensive players at the targeted competition.

Post-season

A day after the SEA Games while the team was waiting to depart for home, I interviewed the coach for the second time in my hotel room and got him to share with me what he had experienced during the season. Semi-structured individual interview was conducted to give him the opportunity to discuss the benefits and challenges of engaging in the reflective practice to improve coaching practice. The time taken for the interview was 87 minutes. Questions such as: “Which were the areas that you thought you had done well? Give me an/some examples? Did you think the information on MST and reflection-card provided for you is useful in your coaching? If yes, in what way? If no, why? Which were the areas that you thought could have been done better? Did the feedback process help in your development as a coach in anyway? If yes, give me an/some examples? If no, why?” were asked.

Individual interviews were conducted with a selection of players to examine their experience in reflective practice in SEA Games preparations. Some of the key questions included: “Was the reflection-card training useful to you? If yes, in what areas? If no, why? What did you like most about the reflection-card experience? What did you like least? How satisfied were you with the reflection-card training package? What were the challenges you faced when trying out the reflection-card? Give examples. Do you have any suggestions to improve the training package in future? The interviews ranged from 45 to 55 minutes.

Data analysis

All interviews were transcribed verbatim by the first author and resulted in 54 pages of A4 size single-spaced text. The interview transcripts were checked for errors and sent to participants via email to have them confirm the accuracy of the shared information. Minor
changes were made by the Head coach subsequently. The interview transcripts were then imported to NVivo 9 (Nvivo, 2011) for coding. The data were inductively and independently analyzed using thematic analysis method (Braun & Clarke, 2006). It began with the division of the text from each interview into meaning units, which are chunks of information that convey a specific meaning. These chunks of text were given labels, called codes. Codes that were similar in meaning were lumped together in the next level of analysis resulting in a number of higher-order categories. A total of 327 meaning units and 76 codes emerged from the players and coach’s data. Three categories were identified with reference to the reflection-card initiative that aims to enhance players’ performance and improve coaching practice. For example, some meaning units were grouped in the themes of ‘positive experience’ and ‘personal development’; which were later organised under the general category of ‘benefits of the programme’. The results were reviewed by my colleague who is experienced in qualitative research to help increase the credibility of the interpretations.
Results

The results were organised according to the following categories based on data emerged from the coach and players in relation to their reflection-card experience: (1) benefits, (2) challenges, and (3) areas for improvement. To distinguish individual participants and for confidentiality purposes, quotes are identified as either C=coach and P1-P6 for the players.

Benefits: Players

Helped Players Monitor and Reflect on Performance

The players felt strongly that they benefited from the training workshops prepared by the learning facilitator in relation to MST and reflection-card. For example, this player mentioned how reflection had helped him monitor his goals and stay focused:

“In terms of setting goals, I felt that every time I came back and saw that I did not hit my goals, I worked harder on areas that I did not achieve my target. Also, you came down to help us and told us to focus on those areas. I could see the progress we made. From the first game to the next, I would remember to box-out. I could see the improvement that I had made.” (P6)

Another player shared how he started to reflect after the training workshops and trying to integrate it in practices and games. He said:

…It all started from the Philippines game, the first game...When I started to believe, reflect and follow the routine, I started to see the fruits (results). That was when I started to encourage my teammate and my coach to tell me more about this stuff (mental toughness an reflection). (P5)

Helped Players Focus and Work on Specific Technical Skills

Most of the players reported positive experience using the reflection-card. One player

shared how the reflection-card helped him to focus and work on specific technical skills improvement:

I was looking into percentage like two points and three points field goal percentage...Assists was another main thing that I was focusing on. So, when I wrote
down those numbers, it reminded me what I needed to do for the team. So that was the plus points for me to reflect and stay focused. (P1)

Promote Responsibility for Self-learning

For any useful learning to take part, learners must take over the ownership of learning. The players in this study reported how the reflection-card promotes individual responsibility for self-learning:

It (reflection-card) encouraged players to think for themselves rather than relying on their coach for instructions and improvement. I thought it was good. I would continue to, practice it and perhaps pass it on to my future generation.” (P4)

I personally felt that (game) statistic was just a number. The useful thing was that you were able to use it to review your goal and plan for the next one. I had high expectation of myself, so when I looked at the number (goal) on the card, I thought a lot and wanted to be better.” (P6)

Easy to Use and Useful to Review Goal

The participants cited the reflection-card was easy to use and less time consuming. P3 said, “I don’t think it was time consuming. I honestly believe that reflection is a very important thing to coaches and player. It helped them review their targets and set higher targets for greater achievement.”

Benefits: Coach

Enhanced and Enriched Professional Knowledge The coach reaffirmed the positive outcomes of the reflection-card training that has helped to enhance and enrich his professional knowledge:

You had provided me the knowledge on how to help players to stay focus and reflect. The workshops and interactions provided useful information to assist me in integrating it into my coaching. I learned how to help my players stay focused, stay concentrated, reflect and get better. When I started to see improvement (team and individual), I’m motivated wanting to learn and do more for my team. Although it was a short two months, I felt that what I’ve learned a lot from you. (C)

Understand Players’ Perspective and Manage Expectations

The coach shared with me how the reflection-card helped him understand the players better and managed their expectations:
It (reflection-card) also provided another area where we learned how to manage the players on what they had written (on the card). For example, key players wanted to play the full game or felt that certain players should not have been played at their expense. It allowed me to understand the player’s perspective but at the same time manage him during our individual debrief session. If a player had set too high or too low an expectation of his game, we will also need to advise the individual about the purpose of setting smart goals. It allowed me to know if the players understood the session prior to the game as well as carry out evaluation after the game. Some players would use the form to voice their frustrations or opinions about the match. It also allowed me to know the players’ expectations of themselves before a game. It provided an avenue for me to identify gaps in my coaching. I might not realize that players have issues with some of the plays…the players occasionally used this as a platform to let me know (the issues).

**Keeping Track of the Team and Individual’s Performance**

The reflection-card has the potential to help coaches monitor team and individual’s performance. The coach in this study said:

> As a coach I am more systematic in monitoring player’s performance during tight games. I have a more in-depth understanding of the team’s standard now as the reflection card encompasses both offensive and defensive items for team and individual player.

The statistics reflected team performance. Players were also able to reflect upon their own performances. Without these statistics, everything was just an opinion. As a coach I felt that I could better pin point the problems now rather than just based on judgments and baseless opinion.

**Enhanced Intrinsic Motivation**

The successful implementation of using MST and reflection-card has increased the motivation of the team and the coach has the desire to continue the good practice:

> I thought everybody in this squad started to notice all these (good) things, especially when they were able to bring home a medal 34 years later at the same competition. When the new batch [of players] join us, I’ll emphasise to them and make sure we do it. Because I’m not easy to be convinced by people, but this time round I could really
see the stuff is working well.

Challenges:

Whilst positive feedback on the reflection-card was reported by the Head coach and players, they also faced some challenges such as the ability to carry out the tasks independently (coach) and attitude in completing the reflection-card. The Head coach said:

_During the training trip to China when you were not with us, players were not serious in filling up the reflection-card (e.g., field goal percentage). The targets set were either too high or too easy to achieve for most of them. I reminded them not to take this exercise lightly but unsure how to guide the players to set realistic target for each game and review it immediately after each game. It is different with you around where I can observe and learn from you._ (C)

Lack of expertise and time constraint appeared to be major challenges to the Head coach. He said:

_My goal is always helping players to improve their technical skills, tactical awareness and fitness level in order to play high level basketball. I used to believe that these were the only components importance to the sport and could only be developed on court or in the gymnasium. Time is always a concern for me, there are so many things I want to do with the team me but it is just not enough!_

Getting players to ‘buy-in’ the idea and carry out the routine (e.g., completing the reflection-card before and after each game, especially at the initial stage of intervention, was challenging. One player said,

_“Some of them (players) felt that it was a waste of time. They just scribbled for the sake of completing the paper.”_ (P5).

Nonetheless, the situation seemed to improve as the season progressed but not without challenges. P2 mentioned,

_“It was better now (end of pre-season) but there were still 1-2 players who felt that it was a waste of time. Maybe these players needed to see results (e.g., winning more games) before they are convinced; hopefully during SEA Games they can change their attitude!”_
Areas for Improvement

Whist the training workshops on reflection-card received overwhelming positive responses from the coach and players, one player suggested how it can be further enhanced to ‘theory-practice-theory’ approach:

What you could do maybe create a practical session. After 10 minutes talk, try to get some good players, bring them in to really play tight defence on them and see how they apply the reflective practice. After which, go back to the lesson again, because during the practical you’ll be able to tell them what to focus and reflect, and go back to the normal routine which is your lesson, and try to continue whatever lesson that you have left out. And I think they will start to believe after the practical…that’s the thing that you can improve i.e. theory-practice-theory. (P4)

The coach also provided some useful suggestions on how the implementation process can be further improved: He said:

I would like to periodically review the player’s performance with a face to face interview together with the learning facilitator. Players can provide direct feedback to me on not only his performances and also his views on the coaching team and teammates. Learning facilitator can serve as a moderator to ensure that the session is objective and fruitful to all.

Discussion

The purpose of the study was to examine the efficacy of using game reflection-card with a Head coach with the aim to enhance athletes’ performance and improve the quality of coaching practice during an intense season. Workshops were organised and relevant materials were provided to the coach and players to facilitate the integration process. The coach was guided and engaged in in-depth discussion with the learning facilitator after each training session/game so that he is confident to integrate reflection-card in his coaching tasks. Such field based authentic learning experience appears to have great value to personal development for coaches as reflective practitioners.

The incorporation of reflective practice within the coaching skill set has the potential to empower and engage athletes to be responsible to their learning and contribute
to their technical and tactical development (Richards et al., 2009). Faull and Cropley (2009) also found similar evidence and concluded that structured reflective practice can help elite triathlete increase self-awareness and evaluative skills. Their results are consistent with the present study. Indeed, players from the present study mentioned how reflection-card helped them to reflect and evaluate their goals, and identify specific areas for personal improvement.

Creating such reflective learning environment has the potential to assist players to achieve and sustain success as players were given ‘choice’ or ‘power’ over their learning (instead of relying on their coach), allowing them to shape and define their own direction/goal (Kidman, 2001), hence promoting intrinsic motivation which has the potential to develop psychological well-being of the athletes (Deci & Ryan, 1985). Future studies should continue to explore best practices that promote reflection with elite coaches and athletes to advance our knowledge.

Armour (2010) suggested that the reflective process must be situated in actual practice and driven by athletes’ learning needs. Indeed, the approach used in the current study to integrate reflection-card as a source to guide reflection represents an important contribution to the literature. Given that the main aim of high performance coaches is to improve athletes’ performance (Lyle, 2002; Mallett, 2010), providing coaches and athletes with access to reflective practice framework represented an important opportunity for them to reflect on ways to optimize their approaches to coaching and performance, in hopes of improving technical, tactical, and mental skills. The results of the present study offer some support to the efficacy of using reflection-card to stimulate reflection and resolve authentic coaching and performance issues. When positive outcomes occur due to changes inspired through reflection, coaches and players might be compelled to reflect even more and at deeper levels because they have experienced the benefits of doing so.

Richards and colleagues (2009) suggest that if coaches are to effectively develop “intelligent performers”, they need to engage their athletes in the reflection process, empower them to become reflective thinkers and autonomous learners, so as to accelerate their technical and tactical development, facilitate the transfer experience and knowledge learnt from practice to competitive environment. Whilst this area is importance, empirical evidence is scarce. Gallimore et al. (2013) also noticed the lack of case report that integrates reflection into actual practice and coach training. The present study contributed to the literature by presenting the process on how elite coaches can empower and develop the skills of the sport performer as a reflective practitioner using reflection-card.
Future study should continue to fine-tune the process to benefits coaches and players at the elite level. The limitations on large scale formal coach education in facilitating coaches’ learning have been recognised by many researchers and alternate informal learning modes have been proposed (Gilbert et al., 2009, Mallet et al., 2009). The present study contributed to the literature by presenting the process on how a learning facilitator can help coaches’ engage in informal learning through the integration of reflection-card in the naturalistic environment, with the aim to enhance coaching practice and athletes’ performance. Players and the Head coach were extremely satisfied with the workshops training and learning outcomes, especially when the team won a bronze medal after 34 years at the same regional competition. They shared with me how user-friendly and relevant the workshops and materials to them. Such findings are consistent with the literature that scientific articles should be simplified and brought down to coaches’ level and show them how to apply theory to practice in a specific context (Gould et al., 1999; Reade, Rodgers, & Hall, 2008). Nonetheless, they also discussed the lack of time and expertise in this area that hindered the team’s potential in the past competitions. The present study demonstrated how such constraints might be overcome by using a learning facilitator who has professional knowledge in the field to fill the gaps. Sport organizations might explore such opportunity with their volunteers, especially the less developed countries when resources are limited, to overcome some of these challenges at the elite level to stay competitive.

Although strategies on reflection-card were presented to the Head coach and players, not all were used optimally on a consistent basis. For example, the coach reported that some players were not paying enough attention in filling up the reflection-card (e.g., target set for each game) initially when I did not follow the team for the second training trip. The coach did not attempt to rectify the issue and guide the players to set realistic target for each game and review it immediately after each game. Several explanations can be put forward to try to explain such findings. First, the length of partnership might not get the Head coach and players to be confident and comfortable using reflection-card (Gilbert et al., 2013). More guidance and time is required for them to be familiarized with the practice and establish a system/culture in a long term. Second, the coach commented on how he sometimes lost sight on the programme’s mandate and wanted to just spend time to work on immediate concerns (e.g., players’ technical skills) rather than other aspects of development (e.g., reflection).
Accordingly, coaches should pay attention to develop other aspects of the athletes (e.g., reflective practitioners) beyond technical skills (Richards et al., 2009). Although strategies shared were not always used optimally by the Head coach in the present study, he shared with me how impactful having a researcher working with him to integrate materials that go beyond simply teaching technical skills in his coaching practice.

Indeed, this is an encouraging finding because the establishment of a comprehensive training system and programme (e.g., integration of sport sciences, supporting staff) is indeed critical at the high performance sports (Richards et al., 2009). The current study demonstrated strategies on how researchers could potentially work with high performance coaches to put in place training system in a favourable development environment. Indeed, such initiative might be particularly useful to less developed countries, especially in Asia. This is because the utility of sport sciences in coaching to enhance athlete’s performance is in its infancy, and government’s financial support in sports is still lacking (Koh, 2009). Future study might want to continue to explore initiatives that help and support coaches and athletes’ learning in an authentic environment.

Whilst feedback on the training package on reflection-card has been positive, participants also shared the challenges they faced during the season and provided some suggestions for improving the process. For example, the players and Head coach discussed how they were initially apprehensive about the training workshops presented to them. They shared with me that they often explored to just on-court training (technical skills), and they used to believe that is the way to learn and improve themselves in this sport. In order to emerge into the subculture of the sport and influence athletes and coaches’ mindset, the background and experience of the learning facilitator is critical to increase participants’ openness towards learning (Camiré & Trudel, 2013). Without the knowledge, experience and understanding of the sport context, it might be challenging to convince coaches and athletes to ‘buy-in’ new initiatives (e.g., reflection-card) in their coaching practice. In addition, individual meetings between the learning facilitator, Head coach and players throughout the season appear to be very useful as this can help build rapport, connections and promote openness and empathy between the learners and facilitator for further engagement in the learning process (Camire & Trudel, 2013).

**Practical Implications**

Based on the findings of the present study and the learning facilitator’s field
experiences, the following recommendations are proposed to help coaches integrate MST and reflection-card into their coaching practice. First, it proved useful to use reflection-card as an important source of information to stimulate coach and players’ reflection. The coach discussed how he made changes to the subsequent practice after receiving feedback (via reflection-card) from his players. The players also discussed how they appreciated the process because it has increased their self-awareness about their performance and progression, and has motivated them wanting to working harder for greater improvement. In addition, the reflection-card allowed them to express their opinions (aside from team debrief) without the fear of being reprimanded or confronted by their coach. Second, learning facilitator’s knowledge and experience appear to be an important factor to consider when working with coaches and players to promote initiatives in coaching practice. He/she should preferably be knowledgeable and experienced in the specific sport he/she is working on with coaches and athletes. This is because facilitators without the contextual field experience might be viewed by coaches and athletes as being too theoretical with little appreciation on the applicability (Camiré & Trudel, 2013). Such perception might have a negative impact on the effectiveness of any informal learning that aims to promote personal and professional development. Finally, more time should be set aside to guide the learners and allow time for them to be familiarized with the new initiative to ensure sustainability. Indeed, the reflection-card protocol should be implemented every season (with minor adjustments if necessary) in order to establish a system/culture that promotes personal responsibility and reflective thinkers to stay competitive in the elite sport.

**Conclusion and Limitations**

The results of the present study demonstrated promising results of using game reflection-card to promote coach’s reflection to enhance athletes’ performance. The result also shows that a learning facilitator can foster programme enhancement, increase coaches’ and players’ self-awareness through reflection, that lead to positive personal development and performance. Moving forward, more research is needed to appraise if learning facilitators can help motivate more elite coaches and athletes with varied profiles to try out similar initiatives in their coaching practice. High performance coaches and athletes are often overwhelmed with other obligations during intense season and might not be interested to invest addition time for such initiatives (Camiré & Trudel, 2013). Nonetheless, giving them full autonomy in the decision-making process is crucial in
engaging them in the learning process.

Several limitations of the present study should be acknowledged. First, I was the principle investigator for the project and the author of this article. Readers should be aware of the subjective nature of the perspective provided in this manuscript even though efforts were made to control some assumptions and interpretations of the findings. Second, the participants were high performance basketball Head coach and players from Singapore, which limits the potential to generalize the results to other sporting contexts and societies.

Nonetheless, more studies should be conducted to examine how high performance coaches and athletes working in different contexts and settings can effectively engage in reflective practice to enhance performance and enrich personal development. Third, only two workshops were conducted during the entire season, reflecting the challenges coaches’ faced to deal with multiple coaching issues (e.g., time constraints, resources support and co-ordination) during the short and intense season. Further studies should focus on strategies and processes high performance coaches employ to balance coaching demands and personal development.
References


Plymouth: Altamira Press.


Reflective Card (Player)

Please return the card to your head coach/assistant coach within 24 hours of game or practice.

Opponent: Myanmar   Venue:   Date: 14/12/13
Results: Win / Loss Score: Home 89  Opponent: 52

Target Outcome Achieved (Circle accordingly):

(A) Skills (Field Goal %)
2-point (Set 60 / Actual 46.7)   Yes   No
3-point (Set 80 / Actual 36.4)   Yes   No
Free-throw (Set 100 / Actual 66.7)   Yes   No
Offensive Rebound (Set 4 / Actual 4)   Yes   No
Defensive Rebound (Set 4 / Actual 4)   Yes   No
Turnover (Set 0 / Actual 1)   Yes   No
Steal (Set 2 / Actual 0)   Yes   No
Assist (Set 3 / Actual 1)   Yes   No

(B) Set-Plays   Yes   No

(C) Physical Fitness   Yes   No

(D) Mental Toughness
Team   Yes   No
Individual   Yes   No

Anything your head coach/assistant coach should be aware of?

Hill.
Player of the Week Nomination Form

The team
Name: [Redacted] Position: [Redacted]

Reasons for Nomination:
It was a great time adjusting on defense that led to breaks.

Reflections

Lead-up Practices:
What did you notice in the practice leading-up to this competition/tour that most likely contributed to today's results?
Defensive rotation and boxing out.

Follow-up Practices:
What did you notice from the competition/game that should be addressed in the next practice sessions?
Bassing and defense.
The effects of sodium bicarbonate and sodium citrate on sport performance of badminton players.

Hartono Soetanto*, Sukadiono**

Prof Dr Soetanto Hartono, staff member of School of Sport Sciences, Surabaya State University

Dr Sukadiono MD, Rector of Muhammadiyah University, Surabaya

Abstract

Anaerobic endurance is crucial in many competitive sports that require activity beyond anaerobic threshold. Sodium bicarbonate and sodium citrate as buffering agents help in prolonging fatigue and time to exhaustion.

Purpose: the purpose of this study was to compare the effects of sodium bicarbonate with sodium citrate in increasing pH, HCO3- ion concentration, lactate concentration, and time to exhaustion.

Method: Thirty badminton student players were randomly selected and randomly assigned to three groups. The first group (the control group) was given placebo, NaCl .9 g/dl, the second group was given sodium bicarbonate 300 mg/kg in 500 ml aqua, and the third group was given sodium citrate 300 mg/kg in 500 ml aqua. Blood pH and bicarbonate ion were measured through Opti Medical Blood gas Analyzer. Lactate was measured by Cobas Roche lactate Analyzer. Appropriate statistics was applied

Results: sodium bicarbonate and sodium citrate are better than control in increasing blood pH, blood HCO3- concentration, lactate concentration, and time to exhaustion (p< .05). Sodium bicarbonate works better than sodium citrate in increasing blood pH, blood HCO3- concentration, lactate concentration, and time to exhaustion (p< .05).

Conclusion: Sodium bicarbonate is a better choice than sodium citrate in fatigue prevention, in increasing anaerobic endurance, and in prolonging time to exhaustion, although sodium bicarbonate and sodium citrate are still significantly different from control.

Key words: blood pH, blood HCO3- ion concentration, time to exhaustion.
Background

Physical training not only has a good impact on health status but also on sport performance (Murthado, 2007). Badminton is very popular in Indonesia. It needs kind of anaerobic performance. As a favorite game that can get gold medals in internation events, badminton players are expected to have a good anaerobic performance. Effective and efficient training is sometimes not good enough to get maximal performance so that trainers finally turn to ergogenic aids that are not prohibited by Olympic Regulations.

In sport performance, fatigue is a prominent factor that needs attention since it limits the ability of muscles to perform well. The causes of fatigue is quite complex; namely central and peripheral fatigue, lack of oxygen in muscle, homeostatic imbalance, changes in body as well as room temperature, substrate depletion or metabolite accumulation (Brooks and Fahey, 1984; Astrand, 1986). Lactic acid, a byproduct of energy producing metabolism, could act as fatigue indicator, although it is not the only cause of muscular fatigue, accumulation of H+ ion from ATP hydrolysis would also cause muscular fatigue (Septiani et al, 2010).

In general, fatigue is cause by two factors, intracellular acidosis and changes in excitation-contraction coupling process. Recovery of excitation coupling process is heavily influenced by external pH since the decrease in pH as a consequence of increase in lactic acid production in muscles disturbed excitation-contraction coupling process (Allen et al, 1995). This situation happens in sport activity in short duration with high intensity. Accumulation of H+ ion is then evacuated through plasma in adjacent surrounding.

Among many attempts to reduce muscular fatigue, the use of sodium bicarbonate as buffer system enforcor could be applied, known as bicarbonate loading. Sodium bicarbonate or NaHCO3 has the ability to inhibit pH increase. Bicarbonate ions react with acid to produce bicarbonate acid or H2CO3, soon after that being decomposed inti H2O and CO2. Sodium bicarbonate consumed results in acute increase of bicarbonate level \([\text{HCO}_3^-]\) and blood pH, therefore increasing buffering capacity of blood against pH decrease. Increa buffering capacity would change intracellular activity and influence in blood efflux of lactic acid and H+ out of cells. Sodium bicarbonate or sodium citrate would decrease H+ ion level and lactate in muscle and postpone the decrease of intracellular pH that has negative impact on glycolisis in muscle. Since sodium bicarbonate
is found in the body in limited amount, consumption of sodium bicarbonate 90 minutes before a game is expected to increase the availability and increase sport performance.

Besides sodium bicarbonate, sodium citrate proved to be effective in increasing blood pH and carbonic acid level (Oopick et al, 2004). Costill et al (1984) stated that by consuming sodium bicarbonate, acidity in muscle was reduced so that fatigue could also be reduced. Consumption of sodium citrate was able to increase plasma volume by increasing sodium ion level in serum, therefore suppressing aldosteron activity (Oopik et al, 2004).

Badminton was an anaerobic activity. It was done with high intensity, high speed and power. So, the energy (Adenosine Tri Phosphate) was supplied through anaerobic glycolysis with a lot of lactic acid as a byproduct (Bahri et al, 2009). Once the anaerobic threshold was achieved when blood lactic acid was 4 mMol/L, fatigue began to show up. Athletes should be trained in accordance with predominant energy so that fatigue could be postponed until later (Mathew and Johnson in Purba, 2002).

Methods

The design of this study was pretest posttest control group design. Thirty badminton players were randomly selected and randomly assigned to three groups consisted of 10 people. During pretest, blood lactate and time to exhaustion were measured. Time to exhaustion was measured from anaerobic threshold to the time they stop running because of exhaustion. During posttest, the first group which acted as the control group was given 500 ml aqua, the second group was given sodium bicarbonate 300 mg/kg in 500 ml aqua, 90 minutes before treadmill testing, the third group was given sodium citrate 300 mg/kg in 500 ml aqua, 90 minutes before treadmill testing. Posttest was conducted at least 3 days after pretest to ensure complete recovery of the sample.

Results

Subject characteristics; all sample were male with the age mean =21 years old. Normality tests were of p > .05 for blood lactate (p=.939) and p > .05 for time to exhaustion (p=.954).

Homogeneity test using Box’s test of equality of Covariance Matrices showed p = .805 (p>.05). So, it meant that the sample was normal and homogenous, so that parametric statistics could be applied.
Figure 1
Posttest blood lactate concentration difference

<table>
<thead>
<tr>
<th>group</th>
<th>group</th>
<th>Sig.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>K2</td>
<td>0.000*</td>
<td>K1 = 6.640</td>
</tr>
<tr>
<td></td>
<td>K3</td>
<td>0.000*</td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>K1</td>
<td>0.000*</td>
<td>K2 = 10.630</td>
</tr>
<tr>
<td></td>
<td>K3</td>
<td>0.568</td>
<td></td>
</tr>
<tr>
<td>K3</td>
<td>K1</td>
<td>0.000*</td>
<td>K3 = 10.140</td>
</tr>
<tr>
<td></td>
<td>K2</td>
<td>0.568</td>
<td></td>
</tr>
</tbody>
</table>

*: signifikan at p < 0.05

K1: control group
K2: sodium bicarbonate group
K3: sodium citrate group

This statistics showed that sodium bicarbonate and sodium citrate gave significant
difference vs control group, but sodium bicarbonate did not differ significantly against
sodium citrate.

Figure 2
Significant difference in posttest Time to Exhaustion

<table>
<thead>
<tr>
<th>Kelompok</th>
<th>Kelompok</th>
<th>Sig.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>K2</td>
<td>0.029*</td>
<td>K1 = 3.400</td>
</tr>
<tr>
<td></td>
<td>K3</td>
<td>0.017*</td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>K1</td>
<td>0.029*</td>
<td>K2 = 6.890</td>
</tr>
<tr>
<td></td>
<td>K3</td>
<td>0.020*</td>
<td></td>
</tr>
<tr>
<td>K3</td>
<td>K1</td>
<td>0.017*</td>
<td>K3 = 6.120</td>
</tr>
<tr>
<td></td>
<td>K2</td>
<td>0.020*</td>
<td></td>
</tr>
</tbody>
</table>

*: significant at p < 0.05

The statistics showed that sodium bicarbonate differed significantly against sodium
citrate, with the best TTE in sodium bicarbonate (6.890 min).

**Discussion**

Requena *et al* (1990) stated that sodium bicarbonate and sodium citrate had
ergogenic function because those supplements increased pH level, bicarbonate ion, and
lactate concentration. McNaughton and Cedaro (1986) found that blood bicarbonate level
increased without increased blood lactate concentration. Increased blood lactate
concentration could only be found in sodium citrate supplement. Parry-Billings and
MacLaren (2005), found in their study that pH increased significantly with sodium citrate
supplement. Increased pH was possible with the role of sodium bicarbonate and sodium
citrate as buffering agents that absorbed hydrogen ions and diverted into H2O
(McNaughton, 1997), so that pH did not fluctuate a lot.
Other benefit of using sodium bicarbonate and sodium citrate is that sodium could maintain body fluid, so it is favorable to the work of the heart. (Zajac et al, 1996). Graydon et al (2004), stated that metabolic effect caused by alkalosis related to the ability of NaHCO3 to maintain optimal pH would delay the onset of intracellular acidification during exercise with high intensity. Graydon et al (2003) stated further that the induced alkalosis triggers an increase in glycolysis that eventually increase training capacity, proven by increased lactate level.

Billat et al (1993) found that one factor related to time to exhaustion was increased blood lactate. In this study, sodium bicarbonate loading also significantly increased time to exhaustion by 3.49 minutes which meant that bicarbonate loading could increase anaerobic endurance, eventhough the effect of sodium bicarbonate loading was not significantly different from sodium citrate loading.

In other study, Hartono et al (2014) found that supplement sodium bicarbonate and sodium citrate 21 g / 500 ml aqua given 60 minutes before treadmill testing did not give any significant difference in time to exhaustion between sodium bicarbonate loading and sodium citrate loading, and control (p>.05), but blood lactate level was significantly higher in sodium bicarbonate and sodium citrate loading compared with control. It could be concluded from this study that time for sodium bicarbonate or sodium citrate to go to extracellular level optimally was 90 minutes, other possible cause was that the physical condition of the sample during treadmill test was not optimal.

McNaughton (1998) stated that the use of sodium citrate is a better choice than sodium bicarbonate in that sodium citrate did not give any inconvenience to gastrointestinal system linked to sodium bicarbonate loading. The side effects to gastrointestinal system could be headache, stomachache, diarrhea up to more serous symptoms.
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Hartono,S, Wiriawan.O, Ashadi. Pengaruh pemberian sodium bikarbonat dan sodium sitrat terhadap kinerja olahraga atlet bulutangkis Citraraya Unesa


THE APPLICATION OF SPORT SCIENCE IN
DEVELOPING ELITE INDONESIAN ATHLETES

Dr Greg Wilson, PhD

Consultant, Indonesian Olympic Committee


INTRODUCTION

The purpose of this paper is to describe Indonesia’s current sporting performance and examine ways and means through which the application of sport science methods and procedures could further enhance the development of elite sport in Indonesia. The focus of the presentation will be on specific policies and initiatives that should be adopted to improve the Indonesian sporting system. The specific topics covered in this presentation include:

1. Indonesia’s current sporting performance
2. Application of Sport Science: Where it works and where it does not work
3. Talent Identification vs Talent Development
4. How to make Sport Science more effective in the Indonesian sport system

1. INDONESIA’S CURRENT SPORTING PERFORMANCE

Table 1 documents Indonesia’s performance in the South East Asian (SEA) Games over the past 20 years. Indonesia performs well in the SEA Games when it hosts the games, for example in 1997 and 2011. However, when not host, Indonesia tends to win only 50 to 60 gold medals and places 3rd or 4th on the overall medal table, typically behind Thailand and Vietnam (see Table 1). Table 2 outlines the population and economic size of some of the countries of SEA. As can be seen, Indonesia is the dominant country of SEA with a population of 250 million people and a rapidly growing economy which is approaching $US 1 trillion (see Figure 1). Indonesia has an economy that is more than twice the size of Thailand and a population almost 4 times as large. However, Thailand consistently outperforms Indonesia in all major international sporting competitions (see Table 3).

<table>
<thead>
<tr>
<th>Host Country</th>
<th>Number of Gold Medals won by Indonesia</th>
<th>Indonesia’s overall placing on Medal Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of gold medals and overall position achieved by Indonesia at the South East</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1:
Asian Games from 1997 to 2013. **Year**

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Golds</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>Indonesia</td>
<td>194</td>
<td>1</td>
</tr>
<tr>
<td>1999</td>
<td>Brunei</td>
<td>44</td>
<td>3</td>
</tr>
<tr>
<td>2001</td>
<td>Malaysia</td>
<td>72</td>
<td>3</td>
</tr>
<tr>
<td>2003</td>
<td>Vietnam</td>
<td>56</td>
<td>3</td>
</tr>
<tr>
<td>2005</td>
<td>The Philippines</td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td>2007</td>
<td>Thailand</td>
<td>56</td>
<td>4</td>
</tr>
<tr>
<td>2009</td>
<td>Laos</td>
<td>43</td>
<td>3</td>
</tr>
<tr>
<td>2011</td>
<td>Indonesia</td>
<td>182</td>
<td>1</td>
</tr>
<tr>
<td>2013</td>
<td>Myanmar</td>
<td>65</td>
<td>4</td>
</tr>
</tbody>
</table>

**Table 2:** Population (millions) and GDP ($US billions), as measured by gross domestic product (GDP), of some of the countries in South East Asia.

- **Country:** Indonesia 250 867
- **Country:** Thailand 67 387
- **Country:** Vietnam 93 170
- **Country:** Malaysia 30 368
- **Country:** The Philippines 101 272
- **Country:** Myanmar 51 56

**Figure 1:** The size of the Indonesian economy as measured by gross domestic product (GDP), from 2004 to 2014. Data from the World Bank Group (www.tradingeconomics.com).

At the Asian Games, Indonesia’s performance has been very consistent over the past 20 years and Indonesia has tended to win about 4 gold medals and place around 15th position on the overall medal table (see Table 3). This consistent performance is in contrast with that of Thailand. Back in 1994 both Indonesia and Thailand won 3 gold medals at the Asian Games. However, while Indonesia has stayed around this same level over the past 20 years, Thailand has improved to win about 12 gold medals and place around 6th position on the overall medal table (see Table 3). Similar to the Asian Games, Indonesia’s performance at the Olympic Games over the past 20 years has been quite consistent. The performance at the London Olympic Games 2012 was very poor. However, on average, over the last 20 years, Indonesia has won about 1 gold medal and placed around 40th on the overall medal table (see Table 4). Given Indonesia has the world’s 4th largest population and the 16th largest economy, it would be expected to perform at a much higher level in major international sporting competitions.
Given the population size and economic strength of Indonesia, it would be reasonable to place 1st in SEA Games, in the top 5 in Asia Games and the top 10 at the Olympic Games. However, as shown in Tables 1, 3 and 4, Indonesia’s performance in the major international sporting events over the past 20 years has been well below these values and has not been improving over this period even as the economy has been rapidly increasing.

Much of the problems in Indonesian sport relate directly to a lack of basic funding. While Indonesia has a large and rapidly growing economy (see Table 2 and Figure 1), the funding allocated to sport is very small and has not increased over time. This results in poor training facilities and equipment for athletes to use. Inconsistent salaries for coaches and athletes are commonly experienced, there are limited opportunities for coach education or training for senior management and a lack of application of sport science. Exact numbers in relation to sports funding are difficult to obtain from countries. However, they are reflected in athletes sent to major international events. As outlined in Table 5, Indonesia has consistently sent a low number of athletes to participate in the Asian Games, primarily due to a limited budget. While Thailand can afford to send well over 500 hundred athletes to the Asian Games, and Malaysia sends a team of about 300 athletes, Indonesia struggles to fund 200 athletes to compete in this important event (see Table 5). The standard current sports policy in Indonesia is to try and do everything as cheaply as possible, and the results of this strategy are clearly seen in the consistently poor results at SEA, Asian and Olympic Games (see Tables 1, 3 and 4).

Table 3: The number of medals and overall position on the medal table for Indonesia and Thailand at the Asian Games from 1994 to 2014.

<table>
<thead>
<tr>
<th>Asian Games</th>
<th>Gold</th>
<th>Silver</th>
<th>Bronze</th>
<th>Total</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 -INA</td>
<td>4</td>
<td>5</td>
<td>11</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>2014 -THA</td>
<td>12</td>
<td>7</td>
<td>28</td>
<td>47</td>
<td>6</td>
</tr>
<tr>
<td>2010 -INA</td>
<td>4</td>
<td>9</td>
<td>13</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>2010 -THA</td>
<td>11</td>
<td>9</td>
<td>32</td>
<td>52</td>
<td>9</td>
</tr>
<tr>
<td>2006 -INA</td>
<td>2</td>
<td>4</td>
<td>14</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>2006 -THA</td>
<td>13</td>
<td>15</td>
<td>26</td>
<td>54</td>
<td>5</td>
</tr>
<tr>
<td>2002 -INA</td>
<td>4</td>
<td>7</td>
<td>12</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>2002 -THA</td>
<td>14</td>
<td>19</td>
<td>10</td>
<td>43</td>
<td>6</td>
</tr>
<tr>
<td>1998 -INA</td>
<td>6</td>
<td>10</td>
<td>11</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>1998 –THA</td>
<td>24</td>
<td>26</td>
<td>40</td>
<td>90</td>
<td>4</td>
</tr>
<tr>
<td>(host)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994 -INA</td>
<td>3</td>
<td>12</td>
<td>11</td>
<td>26</td>
<td>11</td>
</tr>
<tr>
<td>1994 -THA</td>
<td>3</td>
<td>9</td>
<td>14</td>
<td>26</td>
<td>12</td>
</tr>
</tbody>
</table>
Table 4: Indonesia’s performance in the Olympic Games 1984 to 2012.

<table>
<thead>
<tr>
<th>Olympic Games</th>
<th>Athletes</th>
<th>Gold</th>
<th>Silver</th>
<th>Bronze</th>
<th>Total</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>22</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>63</td>
<td>42</td>
</tr>
<tr>
<td>2008</td>
<td>24</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>48</td>
</tr>
<tr>
<td>2004</td>
<td>38</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>2000</td>
<td>47</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>24</td>
<td>38</td>
</tr>
<tr>
<td>1996</td>
<td>40</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>1992</td>
<td>42</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>1988</td>
<td>29</td>
<td>1</td>
<td>1</td>
<td>36</td>
<td>36</td>
<td>16</td>
</tr>
<tr>
<td>1984</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: The number of athletes participating in the Asian Games in 2010 and 2014 for some SEA countries. Data obtained from the Olympic Council of Asia website (www.ocasia.org).

<table>
<thead>
<tr>
<th>Countries</th>
<th>Number of Athletes 2010</th>
<th>Number of Athletes 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>596</td>
<td>517</td>
</tr>
<tr>
<td>Malaysia</td>
<td>333</td>
<td>277</td>
</tr>
<tr>
<td>Vietnam</td>
<td>263</td>
<td>196</td>
</tr>
<tr>
<td>Singapore</td>
<td>240</td>
<td>226</td>
</tr>
<tr>
<td>Indonesia</td>
<td>206</td>
<td>186</td>
</tr>
</tbody>
</table>

According to data provided by the Australian Government for the financial year 2013 to 2014, $120 million was allocated to the national sporting federations in Australia (see reference 1: Australia's Winning Edge – High Performance Strategy 2013). These funds were allocated on a merit based system such that successful sports like swimming received the most funds ($8,781,000 per year); while sports with lower levels of achievement such as judo receive less funding ($684,000 per year). In addition to these funds, similar levels of funds, in the order of $100 million, were provided by the National and State Governments to the National and State Institutes of Sport (Laurence, 2011). This is the sort of sustained funding that is required to produce a world class sporting system. These funds are about 10 times the current level of
funding in Indonesian sport. For an international competitive elite sport system the budget must be in the Trillions of Rupiah, not Billions.

2. APPLICATION OF SPORT SCIENCE: WHERE IT WORKS AND WHERE IT DOES NOT WORK

In the consideration of the application of sport science it is important to establish where these methods and procedures are most effective to optimize their use. Typically academics and sport scientists like to promote the use of sport science in all sports. But their effectiveness has experienced mixed results.

**When sport science is not effective**

Figure 2 documents the winning time achieved in the 100 m female sprint event at the Australian national championships from 1970 to 2014. As can be seen in the figure, the sprint times have basically remained unchanged over this 45 year period. Despite an enormous investment in time and money and thousands of research papers published on improving maximum speed, the 100 m sprint performance has basically remained unchanged. Over this 45 year period there have been 3 outstanding sprint times achieved. In 1969, a 17 year old Australian female sprinter named Raylene Boyle broken the world junior record with a 100 m time of 11.1 s. In 1994 this time was essentially equaled by Melinda Gainsford-Taylor who ran 11.12 s and more recently in 2014 Belinda Green achieved a time of 11.11 s. Basically there has been no change in elite female 100 m sprinting performance in Australia for the past 45 years. In 1981 the Australian Institute of Sport was opened and continues to produce impressive sport science research and data. However, none of this information has led to an improvement in 100 m sprint performance (see Figure 2).

**Figure 2**: Scatterplot of 100 m female sprint time (seconds) at the Australian National Championships from 1970 to 2014 (data adapted from Wilson, 2013). Correlation co-efficient \( r = -0.12 \) (not statistically significant).

Table 6 lists the current world athletic records for 16 popular athletic events for both males and female athletes. Of the total 32 world athletic records listed, 20 (62%) were set prior to the year 2000. Only 4 (12%) of the 32 current world athletic records have been set in the last 3 years. Of the 16 women’s world athletic records listed 8 (50%) of them were set back in the 1980’s. At the recent world athletic championships held in Moscow in August 2013 an incentive bonus of $US 100,000 was available for any athlete who broke a world record. No one did. Performance improvements would be expected over time as the world population continues to grow and more developing countries are building sporting facilities and allowing
opportunities for more countries and people to participate in elite sports. However, over the past 20 years there has been a remarkable increase in the amount of sport science research conducted and this information has not resulted in noticeable performance improvements in sports such as athletics. Such sports have a very strong genetic component and the sport science information gained provides interesting information about the sports. However, it cannot change the basic physiology of the athlete and hence competitive performance remains unaffected. As stated by Wilson (2013): intensity and that the more advanced training technologies and systems that have emerged over the past 30 years are not effective at improving elite performance as the human body is unable to further adapt to the stimulus presented” (Wilson, 2013 page 13).

Table 6: Current world athletic records for 16 popular athletic events and the dates on which the records were set. Data obtained from the International Athletics Federation website www.iaaf.org).

of the famous Oxford-Cambridge rowing boat race and reported that “Boat velocity has increased linearly by 2-3% per decade since the first Oxford-Cambridge boat race in 1829” and that “A 10-fold increase in training load over the last 150 years probably accounts for about one-third of the increase in physical capacity and performance. The rest of the improvement is due to reductions in boat drag, increases in oar blade efficiency, and improvements in rowing technique.” (Seiler, 2006 page 12).

There is little doubt that sport science has been useful in improving sports equipment design such as improved rowing boats and oars, more buoyant and streamlined swimming suits, enhanced design of bikes and aero-dynamic helmets, improved tennis rackets and string design etc (see Figure 3).

Figure 3: The use of wind tunnels to improve the aerodynamic design of helmets and clothing worn by elite cyclists.
Another area where sport science has been effective is in improving the longevity of elite athletes. Due to improvements in the strength and conditioning programs and enhanced nutrition and recovery procedures we are now witnessing an era where elite athletes, such as Roger Federer and Serena Williams, are still competing at the highest level well into their 30’s. This has great relevance to Indonesian sport as many of our best athletes are currently in their late 20’s and would in previous generations be ready for retirement.

Table 7 lists the age of all Indonesia’s Olympic medal winning athletes. Examination of the data in Table 7 reveals that:

1. The average age of Indonesian Olympic Medal winners is 24 years, with a minimum age of 17 and maximum of 32 years.
2. Only 2 teenage Indonesian athletes and only 1 athlete over 30 have won Olympic medals.
3. For Olympic Gold Medal winners the average age is also 24 years of age with a minimum of 21 and a maximum of 28 years.
4. On the basis of this data it is concluded that the “Golden Age” for Indonesian Olympic athletes is in their mid-twenties.

Further analysis of the data in Table 7 reveals that only 4 Indonesian athletes have ever won an Olympic medal in more than 1 Olympic Games (Susí Susanti, 1992 and 1996; Lisa Rumbewas 2000 and 2004; Eko Yuli Irawan and Triyatno 2008 and 2012). No Indonesian has ever won 3 Olympic medals in 3 different Olympic Games. This is generally not achieved as the effects of the ageing process reduce performance and increase the likelihood of injury as the athlete moves out of their ‘Golden Age.’ The closest to achieving this feat was Lisa Rumbewas who won a silver medal in the 2000 and 2004 Olympic games (210 kg) and placed 4th in the 2008 Olympics (206 kg). Lisa was only 28 years of age at the Beijing Olympics 2008. However, this was her third Olympic Games and she had been lifting for many years and had accumulated some injuries and her performance had already dropped and thus she did not win a third Olympic medal.

We need to consider this data with reference to outstanding current athletes like Weightlifters Triyatno and Eko Yuli Irawan, and elite Badminton athletes like Hendra Setiaawan and Liliyana Natsir. Based on the data outlined in Table 7 it would be remarkably unlikely for them to win medals at the Rio Olympics 2016. If we are serious about helping these athletes to win more medals in Rio we will need a new approach which emphasizes their physical development, adopts enhance recovery and nutrition methods and reduces their competition schedule. This
will help to avoid injuries and maintain their physical capacities as they age and move into their 30’s and to their third Olympic Games.

**Table 7:** Indonesian medalists at Olympic Games 1988 to 2012

<table>
<thead>
<tr>
<th>Olympics</th>
<th>Name(s) and Age(s)</th>
<th>Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998 Seoul</td>
<td>Lilies HANDAYANI (23), Nurfitriyana SAIMAN (26) and Kusuma WARDHANI (24)</td>
<td>Silver medal female Archery team</td>
</tr>
<tr>
<td>1992 Barcelona</td>
<td>Susi SUSANTI (21)</td>
<td>Gold medal female Badminton singles</td>
</tr>
<tr>
<td>1992 Barcelona</td>
<td>Alan BUDI KUSUMA (24)</td>
<td>Gold medal male Badminton singles</td>
</tr>
<tr>
<td>1992 Barcelona</td>
<td>ArdyBernardus WIRANATA (22)</td>
<td>Silver medal male Badminton singles</td>
</tr>
<tr>
<td>1992 Barcelona</td>
<td>Rudy GUNAWAN (25) / Eddy HARTONO (28)</td>
<td>Silver medal male Badminton doubles</td>
</tr>
<tr>
<td>1992 Barcelona</td>
<td>Hermawan SUSANTO (25)</td>
<td>Bronze medal male Badminton singles</td>
</tr>
<tr>
<td>1996 Atlanta</td>
<td>Rexy Ronald MAINAKY (28) / Ricky Achmad SUBAGJA (25)</td>
<td>Gold medal male Badminton doubles</td>
</tr>
<tr>
<td>1996 Atlanta</td>
<td>Mia AUDINA (17)</td>
<td>Silver medal female Badminton singles</td>
</tr>
<tr>
<td>1996 Atlanta</td>
<td>Susi SUSANTO (25)</td>
<td>Bronze medal female Badminton singles</td>
</tr>
<tr>
<td>1996 Atlanta</td>
<td>Denny KANTONO (26) / Antonius IRIANTO (23)</td>
<td>Bronze medal male Badminton doubles</td>
</tr>
<tr>
<td>2000 Sydney</td>
<td>Tony GUNAWAN (25) / CandraWIJAYA (25)</td>
<td>Gold medal male Badminton doubles</td>
</tr>
<tr>
<td>2000 Sydney</td>
<td>HENDRAWAN (28)</td>
<td>Silver medal male Badminton singles</td>
</tr>
<tr>
<td>2000 Sydney</td>
<td>Minarti TIMUR (32) / Tri KUSHANJANTO (26)</td>
<td>Silver medal mixed Badminton doubles</td>
</tr>
<tr>
<td>2000 Sydney</td>
<td>Raema Lisa RUMBEWAS (20)</td>
<td>Silver medal 48 kg female weightlifting</td>
</tr>
<tr>
<td>2000 Sydney</td>
<td>Sri INDRIYANI (21)</td>
<td>Bronze medal 48 kg female weightlifting</td>
</tr>
<tr>
<td>2000 Sydney</td>
<td>WinarniBinti SLAMET (24)</td>
<td>Bronze medal 53 kg female weightlifting</td>
</tr>
<tr>
<td>2004 Athens</td>
<td>Taufik HIDAYAT (23)</td>
<td>Gold medal male Badminton singles</td>
</tr>
</tbody>
</table>
2004 Athens  | Raema Lisa RUMBEWAS (24) | Silver medal 53 kg female weightlifting  
2004 Athens  | Eng HIAN(27)/FlandyLIMPELE (30) | Bronze medal male Badminton doubles  
2004 Athens  | SoniDwi KUNCORO (20) | Bronze medal male Badminton singles  
2008 Beijing | MarkisKIDO (24)/HendraSETIAWAN (24) | Gold medal male Badminton doubles  
2008 Beijing | Liliyana NATSIR (23)/Nova WIDIANTO (30) | Silver medal mixed Badminton doubles  
2008 Beijing | Maria Kristin YULIANTI (23) | Bronze medal female Badminton singles  
2008 Beijing | TRIYATNO (20) | Bronze medal 62 kg male weightlifting  
2008 Beijing | EkoYuli IRAWAN (19) | Bronze medal 56 kg male weightlifting  
2012 London | TRIYATNO (24) | Silver medal 69 kg male weightlifting  

3. TALENT IDENTIFICATION VS TALENT DEVELOPMENT

Sport science has typically been used to attempt to enhance the performance of elite athletes so that they can find the extra 1-2% in their performance to win the gold medal or break the current records. However, in many sports, such as athletics or weightlifting, such improvements have been hard to achieve. Tables 8 and 9 outline the performance of Indonesia’s best 5 swimming and track and field athletes over the past 5 years. As can be seen in the tables, their performances have been largely unchanged over this period of time. Indonesia’s best swimmer is I Gede Siman Sudartawa. He was the only Indonesian swimmers to qualify for the London Olympic Games in 2012. Siman was born on 8 September 1994. At the SEA Games in 2011, as a 17 year old athlete, he won several gold medals and set a record time of 55.59 s in the 100 m backstroke event. He has trained very hard over the past 4 years and undertaken all sorts of training interventions and competed in the London Olympics 2012, World Championships 2013, SEA Games 2013 and Asian Games 2014, but his 100 m backstroke time has remained remarkably consistent over this time (see Table 8). As outlined in Tables 8 and 9 this failure to improve performance is quite common in Indonesia’s elite athletes. Some athletes, such as swimmers Glenn and Indra, have spent considerable time at overseas training camps in Singapore and Europe, but their performance has not improved. It seems that often elite athletes reach their peak performance quite early in their careers and then basically continue to repeat this performance, with little change, until injury or the ageing process results in deterioration. This stagnation in elite competitive performance is quite common in elite athletes throughout the world.
Table 8: Performance for Indonesia’s elite swimmers from 2009 to 2014.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Siman</td>
<td>100 m Backstroke</td>
<td>55.59 s</td>
<td>55.99 s</td>
<td>55.55 s</td>
<td>55.80 s</td>
<td>55.73 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glenn</td>
<td>100 m Butterfly</td>
<td>54.70 s</td>
<td>53.17 s</td>
<td>53.93 s</td>
<td>53.79 s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indra</td>
<td>100 m Breaststroke</td>
<td>1:01.92 s</td>
<td>1:04.7 s</td>
<td>1:02.84 s</td>
<td>1:03.18 s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yessy</td>
<td>200 m Backstroke</td>
<td>2:15.73 s</td>
<td>2:20.35 s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triady</td>
<td>50 m Freestyle</td>
<td>23.32 s</td>
<td>23.14 s</td>
<td>23.12 s</td>
<td>23.35 s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triady</td>
<td>100 m Freestyle</td>
<td>51.24 s</td>
<td>52.22 s</td>
<td>51.36 s</td>
<td>49.99 s</td>
<td>51.4 s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9: Performance for Indonesia’s elite track athletes from 2009 to 2014.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agus</td>
<td>10000 m</td>
<td>29:51.4</td>
<td>29:25.77</td>
<td>30:10.43</td>
<td>30:2</td>
<td>5.33</td>
<td></td>
</tr>
<tr>
<td>Yahuza</td>
<td>Marathon</td>
<td>2:21:56.12</td>
<td>2:35.01</td>
<td>2:27.45</td>
<td>2:36.3</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Dedeh</td>
<td>110 m hurdles</td>
<td>13.34 s</td>
<td>13.20 s</td>
<td>13.53 s</td>
<td>3 DQ</td>
<td>3 s</td>
<td></td>
</tr>
<tr>
<td>Triyangingsih</td>
<td>5000 m</td>
<td>15:56.79</td>
<td>16:06.37</td>
<td>16:06.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triyangingsih</td>
<td>10000 m</td>
<td>32:49.4</td>
<td>33:07.45</td>
<td>34:52.74</td>
<td>34:3</td>
<td>2.68</td>
<td></td>
</tr>
<tr>
<td>Triyangingsih</td>
<td>Marathon</td>
<td>2:31:49</td>
<td>2:45.35</td>
<td>2:41.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MariaLonda</td>
<td>Long jump</td>
<td>6.23 m</td>
<td>6.47 m</td>
<td>6.39 m</td>
<td>6.55</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 9: Performance for Indonesia’s elite track athletes from 2009 to 2014.

<table>
<thead>
<tr>
<th>Athlete</th>
<th>Event</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agus</td>
<td>10000 m</td>
<td>29:51.4</td>
<td>29:25.77</td>
<td>30:10.43</td>
<td>30:2</td>
</tr>
<tr>
<td></td>
<td>Marathon</td>
<td>2:21:56</td>
<td>2:35.01</td>
<td>2:27.45</td>
<td>2:36.03</td>
</tr>
<tr>
<td>Yahuza</td>
<td>Marathon</td>
<td>2:21:56</td>
<td>2:35.01</td>
<td>2:27.45</td>
<td>2:36.03</td>
</tr>
<tr>
<td>Dedeh</td>
<td>110 m hurdles</td>
<td>13.34 s</td>
<td>13.20 s</td>
<td>13.53 s</td>
<td>DQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Triyangingsih</td>
<td>5000 m</td>
<td>15:56.79</td>
<td>16:06.37</td>
<td>16:06.0</td>
<td>1</td>
</tr>
<tr>
<td>Triyangingsih</td>
<td>10000 m</td>
<td>32:49.4</td>
<td>33:07.45</td>
<td>34:52.74</td>
<td>34:3</td>
</tr>
<tr>
<td></td>
<td>Marathon</td>
<td>2:31:49</td>
<td>2:45.35</td>
<td>2:41.15</td>
<td>2.68</td>
</tr>
<tr>
<td>MariaLonda</td>
<td>Long jump</td>
<td>6.23 m</td>
<td>6.47 m</td>
<td>6.39 m</td>
<td>6.55 m</td>
</tr>
</tbody>
</table>

In November 2012 Dr David Martin from the Australian Institute of Sport visited Jakarta and presented a seminar on the topic of sport science. He presented data which indicated that the training process resulted in only a 10% improvement in VO$_2$ max (see Figure 4). The implication from this data is that the most important aspect of a successful elite sports program is finding the talented athlete, as the training process will only make a relatively small change to performance. Most of the effort needs to be made in the identification of potentially talented athletes.

This is one of the reasons why many countries are spending a large portion of their sports budgets on buying talented athletes from other countries, as seen in the recent Asian Games in Korea, where newly nationalised African athletes dominated the athletic competition on the track (see www.incheon2014ag.org). Even though countries like Qatar have excellent sport science facilities they are not effective at developing home grown athletes. As sports
performance is heavily based on genetic ability these countries find it more effective to simply buy established talented athletes from other countries rather than trying to develop their own. We are also seeing this in Indonesia where many provinces are spending a large portion of their sport budgets buying established athletes from other provinces rather than trying to develop their own. This is an effective strategy but should be stopped as it is not resulting in the identification of new sporting potential. Better long term results for Indonesia would result if athletes could only compete in PON on one occasion and had to represent their province of birth. This would result in the provinces spending their sporting budgets in finding the new seeds, rather than using their scare funds in paying already established athletes. These established athletes should be focusing on SEA, Asian and Olympic Games and not be allowed to participate in PON, which should be reserved for new athletes only. With Surabaya hosting the Asian Youth Games in 2021 it is the perfect time for sport scientists to be developing talent identification tests and focusing on finding the new talented seed that will be the new Indonesian champion.

Figure 4: Data presented by Dr David Martin from the Australian Institute of Sport in a seminar in Jakarta on 30 November 2012.

In 2013 I performed a study that examined elite weightlifting and athletic performance data at national and world championships over a 40 year period. In this study I found that there had been relatively little improvement in performance. I concluded that:

“There may well be no problem with sport science techniques and methods. However, when applied to experienced elite athletes who are already at their upper physiological limits their capacity to further enhance performance may be extremely limited simply due to the failure of the elite athlete to be able to respond. Better long term improvements in competitive sporting performance may be achieved by using sport science methods, techniques and technologies to identify children who have the natural capability to achieve outstanding sporting performance. Once identified relatively simple training procedures may produce outstanding results.” (Wilson, 2013 page 14).

4. HOW TO MAKE SPORT SCIENCE MORE EFFECTIVE IN THE INDONESIAN SPORT SYSTEM

One way to make sport science more effective is for it to focus more on talent identification rather than on trying to improve the performance of established elite athletes. A further suggestion is to provide incentives for sport scientists and universities to be more focused on sports development and real world athletic achievement. Most university academics and the institutions themselves receive funding on the basis of the number of students enrolled in the
program and the number of academic publications, conference presentations and research grants 14 received. Sport scientists can publish hundreds of papers and present in many conferences presenting information that may have no direct relevance to enhancing sporting performance. This has resulted in a system where academics develop close relationships with other academics and come to arrangements on joint publication of papers. Well established relationships are also developed with the editors and reviewers of journals and granting bodies. However, often there are little or no relationships to sporting federations, coaches or athletes. An academic can be promoted to become a professor on the basis of hundreds of publications on the topic of improving running speed, and yet not one of these publications may have actually helped anyone run faster.

It is common in the field of science to promote evidence based methods. However, this evidence cannot be solely produced in the research laboratory. Laboratory research must be validated in the real world. If you have some effective methods and techniques to improve sprint performance they should not only appear in research publications, but must also be demonstrated in the real world of sporting competitions. An effective medical treatment should be published in peer reviewed scientific journals, but it also must be demonstrated to be effective by assisting sick individuals in clinical practice. Otherwise what is the point? The same is also true for sport science. Ultimately the most important evidence is that which is demonstrated on the sporting field, not in the library.

To make the area of sport science more effective it would be logical to ensure that the sport scientists and the universities which employ them have a direct incentive to improve performance. Academic promotion and funding for the Universities should be at least partially based on athletic achievement. Sport universities should be required to have an athlete development program as part of their program and rankings achieved at the University games should be used as one of the criteria for academic promotion and university funding. Research funding should be linked to the number of new national records broken and overall athletic achievement. Sport academics and sport universities need to have some direct incentive for enhancing performance to focus their theoretical work into producing real world sporting improvements. The key performance indicators for sport science academics and sport universities need to include some real world performance outcomes, not just based on research publications, conference seminars and grants. If this was to occur then academics would have an incentive to develop close relationships with sport federations, coaches and athletes and be focused on achieving real world sporting improvements.
CONCLUSIONS AND RECOMMENDATIONS

On the basis of the data presented the following conclusions and recommendations are made:

1. Indonesia’s sporting performance in the SEA, Asian and Olympic Games has been consistently poor over the past 20 years and there are no signs of improvement even though the Indonesian economy has increased dramatically over this period. Indonesia has tended to place 3rd to 4th in SEA Games, about 15th in Asian Games and around 40th in the Olympic Games. Given that Indonesia has the 4th largest population and 16th largest economy in the world it would be reasonable for Indonesia to place 1st in SEA Games, top 5 in Asian Games and top 10 in the Olympic Games. Substantial reforms and increases in funding for elite sport are required for Indonesia to achieve its real sporting potential. However, the first step to real change is the tacit realisation that the current sporting system has failed and is not producing the desired results and real and substantial change is urgently required. If Indonesia continues on the same path then these poor results will continue. Real and substantial reform is the only option.

2. Sport science has not been effective in improving performance in sports such as athletics, which are heavily based on genetic factors. However, sport science has been effective in improving performance in sports which are heavily based on equipment such as rowing, cycling and tennis. Also improved strength and conditioning, enhanced recovery practices and improved nutrition appear to have assisted in increasing the longevity of elite athletes and this has direct relevance for Indonesia’s preparations for the Rio Olympic Games 2016 as many of our leading athletes are moving towards 30 years of age.

3. It is recommended that sport scientists should focus more on the identification of talent and the development of useful and practical tests which would allow such talent to be identified in the mass screening of students at school and community centres. This use of sport science staff and technology is likely to produce better long term development of sport as compared to trying to improve the performance of already established elite athletes, who have achieved their peak performance and are unlikely to improve.

4. The hosting of the Asian Youth Games by the city of Surabaya in 2021 should result in a sustained effort by sport scientists to develop practical and effective talent identification programs involving the mass screening of youth in school and community settings to find the new champions to represent Indonesia in this important event.
5. The Indonesian National Sporting Games (PON) should be modified so that athletes can only compete on one occasion and only for their province of birth. This will prevent many provinces from spending most of their sport funds on buying established athletes and redirect these funds to the search for new talented athletes living in their province. Established athletes should focus on performance at the SEA, Asian and Olympic Games and not be permitted to compete in PON on more than one occasion.

6. Sport science academics and sport universities should develop athlete programs and the promotion of academics and funding received by the university should be partially based on the results achieved in university sporting competitions such as the University Games. This policy will motivate academics to be more directly involved in the development of sport, forging useful relationships with sporting organisations, coaches and athletes rather than simply publishing large volumes of research papers which may have little real impact on sporting performance.
REFERENCES
Resistance training, also known as strength or weight training, is well established as an effective method of exercise for developing muscular fitness (i.e. the ability to generate muscle force) [1].

Fleck and Kraemer [2] describe the primary goals of resistance training as improving muscular strength and endurance, while other health-related benefits derived from resistance training include increases in bone mass, reduced blood pressure, increase muscle mass, a vital part of the process, as prescription of any and connective tissue cross-sectional area (CSA), reduced body fat, and it may relieve low back pain [3].

**Figure 1:** Proper Program Design of Resistance Training Incorporates the Acute Program Variables and Key Training Principles [2,4,8]
Evaluation and Assessment

The first step in designing resistance training program, and perhaps the most important, is to evaluate the characteristics of the sport and to assess the athlete’s physical profile (Need analysis). Ultimately, a resistance training program should mirror the movement patterns of the sport as closely as is feasible. The same applies to the physiological demands of the sport – a cross country runner for example, requires high levels of muscular endurance. A volleyball player would benefit from explosive power and a hockey player would benefit from basic strength, explosive power and strength endurance.

The only way to ascertain the most appropriate resistance training program design is through a battery of fitness tests. As a rule of thumb, one repetition maximum testing for the upper and lower body is appropriate for most sports.

Periodization in Designing Resistance Training Program (Chronic Program Manipulations)

The key to designing really effective short, mid, and long term resistance exercise programs is to develop a system that efficiently plans, organises and manages all of the exercise variables. Periodization can be defined as a system for program design that plans appropriate cycles and training phases, organises routines and manipulates all exercise variables.

Periodization has been time proven for success in achieving training goals and has been used by training coaches and trainers for over 50 years. Research has confirmed that periodization has the ability to produce significantly better results than straight set training or normal progression type training. A continued variety of training stimulus is needed in order to progress after the initial adaptation to training has taken place. The neuromuscular system learns what we are doing in our training and quickly adapts to any new training stimulus that we give it. When this adaptation has taken place then progression will halt or may even reverse.

Periodization offers a specific strategy for helping women get stronger with resistance training. It has been well documented that appropriate resistance training can help people across a broad range of ages, fitness levels and health statuses. Resistance training improves muscular strength, muscular endurance and body composition while
assisting the body to manage chronic ailments such as diabetes mellitus, obesity, hypertension, bone and joint diseases (osteoporosis and osteoarthritis), and depression[39].

Table 1: Sample Classical Periodization

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypertrophy</th>
<th>Strength</th>
<th>Power</th>
<th>Peaking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sets</td>
<td>3-4</td>
<td>2-3</td>
<td>2-3</td>
<td>1-3</td>
</tr>
<tr>
<td>Reps</td>
<td>8-12</td>
<td>6-7</td>
<td>3-5</td>
<td>1-3</td>
</tr>
<tr>
<td>Intensity</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Volume</td>
<td>high</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 2: Sample Block Variables

<table>
<thead>
<tr>
<th>Goal</th>
<th>General Training</th>
<th>Sports Specific</th>
<th>Taper &amp; Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>Hypertrophy</td>
<td>Strength</td>
<td>Power</td>
</tr>
<tr>
<td>Sets</td>
<td>3-4</td>
<td>2-3</td>
<td>1-3</td>
</tr>
<tr>
<td>Reps</td>
<td>8-12</td>
<td>6-7</td>
<td>3-5</td>
</tr>
</tbody>
</table>
Acute Program Variables

Designing a resistance training program is a complex process incorporating several acute program variables [4,8] and key training principles [2] (Figure 1). Several key training principles govern safe and effective resistance training program design, including overload, specificity, adaptation, progression, individualisation and maintenance [2]. At such, when prescribing resistance exercise, one must decide what constitutes an optimal balance of these factors while considering the individual’s current level of condition, trainable strength characteristics and personal goals [7]. Proper program design is essential to maximise the benefits associated with resistance training [3].

The effectiveness of a resistance training program to achieve a specific training outcome depends on several acute program variables [4,8], all of which affect the degree of the resistance training stimuli. A recently published position stand by the American College of Sports Medicine [4] revised acute program variables included: (i) muscle action; (ii) loading and volume; (iii) exercise selection and order; (iv) rest periods; (v) repetition velocity; and (vi) frequency.

i. Muscle Action

Most resistance training program includes dynamic repetitions of concentric (CON) and eccentric (ECC) muscle actions, with isometric muscle actions suggested it play a secondary stabilising role [4]. Several training studies have demonstrated that dynamic muscular strength and morphological changes is
muscle have been greatest when both CON and ECC actions are used in a resistance training program [9-11]. Growth hormone (GH) secretion is specific to the muscle action used during acute resistance exercise, with CON actions producing a greater GH response [15,16].

ii. Loading and Volume

Alterations of training load and volume have been shown to affect hormonal [17-19], neural [20-22] and hypertrophic [6,12,23] responses and subsequent adaptations to resistance training.

Load refers to the amount of weight assigned to an exercise set [25], and is probably the most important variable in resistance training program design [26]. The training load can be determined by either Repetition Maximum (RM) or some percentage of the One Repetition Maximum (1RM) [5]. Heavy loads are used if the goal is power (1-3RM) or maximum strength (3-8RM), moderate loads for Hypertrophy (8-15 RM) and low loads for muscular endurance (>20 RM) [2].

Volume describes the total amount of work performed within a training session [24] and is typically calculated as: (i) total repetitions (sets x repetitions) [28] or volume load (sets x repetitions x resistance) [4]. Training volume is prescribed in terms of the number of rep per set, number of sets per session, and the number of session per week [24]. Resistance training program targeting muscular strength and hypertrophy are best served by moderate to heavy loads (6-15RM) and moderate volume (3-4 sets per exercise) [12,29].

iii. Exercise Selection and Order for a Specific Outcome

Exercise selection involves choosing exercises for a resistance training program [25]. Several terms have been suggested for exercise classification, including primary or assistance, structural of body-part, and multi-joint or single joint [3,8], all of which are based on the size of the muscle area involved. The literatures indicate that both single and multiple-joint exercises are effective for increasing muscular strength and hypertrophy [9,12,13], therefore, both should be incorporated into the resistance training program design.
Exercise order refers to a sequence of resistance exercises performed during one training session [25]. Traditionally, exercises involving large muscle mass (multi-joint) are performed first, followed by exercises involving small muscle mass (single-joint) [1]. Performing large muscle mass, multi-joint exercises early in the workout has been shown to produce significant elevations in anabolic hormones [30,31]. Kraemer and Ratamess [32] propose that such a response may potentially expose smaller muscles to a greater response that that resulting from performing small muscle mass exercises only.

iv. Rest Periods

The time dedicated to recovery between sets and exercises is termed the rest period [25]. The length of the rest period is dependent on the training goal, the relative load lifted, and the training status of the individual. The rest period id a primary determinant of the overall intensity [8], as rest period length is strongly related to the load lifted [25]. The rest period length not only determines how much of the adenosine triphosphate (ATP) – phosphocreatine (PCr) energy source is recovered [3], but also how high lactate concentrations increase in the blood [34,35].

When prescribing rest periods, if the resistance exercise program is designed for power then 5-8 minutes is necessary, while 3-5 minutes is required for maximal strength [19,36]. If program is designed for muscular hypertrophy, shorter rest periods of 1-2 minute are prescribed [19,33]. If the goal is muscular endurance, rest periods of 30-60 seconds are used [2, 19].

v. Repetition Velocity (Speed Execution)

The recommended “Gold Standard” for repetition velocity as outlined by Westcott [37] is a 2:1:4 (2 sec CON; 1 sec pause; 4 sec ECC). Generally, it is recommended that a slow repetition velocity (2sec CON; 4 sec ECC) be used for novice and intermediate trainer [4]. For advance trainers the inclusion of a velocity continuum from slow to fast may maximise strength and power gains at specific velocity; however, the use of faster velocity may increase the probability of injury of the musculoskeletal system [37].

vi. Frequency
Training frequency refers to the number of training sessions completed in a given time period (i.e. one week) [25], and is a function of the type of training session, the training status and recovery ability of the individual [27]. It is recommended that untrained individuals perform a complete-body protocol 2-3 days/week. As training status increases, changed in frequency to 3-4 days/week may accompany changes in program design, with training frequencies of 4-6 days/week suggested for advanced trainers [4].

Table 3: Recommendations for Acute Program Variables [2,4,13,20]

<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>Muscle Action</th>
<th>Loading (RM) and Volume</th>
<th>Exercise Selection and Order</th>
<th>Rest Periods</th>
<th>Repetition Velocity</th>
<th>Frequency (D/wk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscular Endurance</td>
<td>ECC:CON</td>
<td>&gt;20 high</td>
<td>SJ/MJ Mixed</td>
<td>30-60 sec</td>
<td>1:0:1</td>
<td>1-2</td>
</tr>
<tr>
<td>Maximal Strength</td>
<td>ECC:CON:ISO</td>
<td>3-8 mod</td>
<td>Ige ml MJ</td>
<td>3-5 min</td>
<td>1:1:1</td>
<td>3-4</td>
</tr>
<tr>
<td>Power</td>
<td>ECC:CON</td>
<td>1-3 low</td>
<td>Ige ml</td>
<td>5-8 min</td>
<td>Explosive</td>
<td>4-6</td>
</tr>
</tbody>
</table>

CON = concentric; ECC = eccentric; high = 4-6 sets per exercise; ISO = isometric; Ige = large muscle mass; low = 2-4 sets per exercise; MJ = multi-joint; mod = 3-5 sets per exercise; RM = repetition maximum; SJ = single joint; sml = small muscle mass

References

Effect of Aquarobic Exercise Program on Adiponectin and IL-6 level in Obese Women
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Running title: Effect Aquarobics on Adiponectin and IL-6 Levels

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Abstract
Exercise training has been shown to have anti-inflammatory effects in obese women. Changes in adiponectin and interleukin-6 (IL-6) serum concentrations in response to training could contribute to these beneficial effects. In this study, we investigated the effect of 8 weeks aquarobics exercise program on adiponectin and IL-6 serum in obese women. Twenty-four sedentary obese women were randomly assigned to the control (N=12) and Aquarobics (N=12) groups. Aquarobics program consisted of a 60-min in the water immersion at 30° performed for 8 weeks. The experimental group underwent aquarobics exercise of three sessions per week for 12 weeks, while the control group did not participate in the training program during the study period. Ten milliliters of venous blood was taken from each participant at the beginning of the study end of week 8 to measure the levels of adiponectin and interleukin-6. The findings showed that aquarobics exercise led to increase in the levels of adiponectin (P<0.005) and IL-6 (P<0.005) which significant increases in aquarobics group. Our study provides that aquarobics exercise increased by improving the adiponectin levels and levels of IL-6. Aquarobics exercise can be used as effective non-pharmacological treatment to prevent diseases.

Key words: aquarobics exercise, adiponectin, IL-6, obese women
Introduction

Obesity, diabetes and hyperlipidemia are lifestyle-related diseases that are receiving attention throughout the world. It is known that the development and progression of lifestyle-related diseases are closely associated with overeating, lack of exercise and heredity (1). The lack of exercise not only increases fat that stores surplus energy, but also decreases the function of bones and muscles. Adipose tissue is a rich source of metabolically active molecules, including tumor necrosis factor-alpha (TNF-α), leptin, and adiponectin (2). Adiponectin is a protein hormone, that is produced and secreted exclusively by adipocytes, regulates the metabolism of lipids and glucose, and exhibits anti-inflammatory properties. Adiponectin levels have been reported to rise in response to weight loss (3). Decreased plasma adiponectin has been linked to obesity (4)insulin resistance, type 2 diabetes mellitus (T2DM)), and atherosclerosis (5). By contrast, increased plasma adiponectin is associated with reduced body weight and improved insulin sensitivity (6). Circulating adiponectin levels are modulated by diet and exercise associated with substantial weight loss (7,8). However, numerous studies on changes in adiponectin levels following exercise training have reported conflicting results (9).

Physical activity can be considered and effective factor in improving obesity. However, there is contradictory information on the effect of physical activity on the levels of leptin, adiponectin and inflammatory markers (CRP, IL-6 and TNF-α) (10,11). The effect of exercise on adiponectin concentrations varies among individuals. Kobayashi et al (9) observed that 50 days of walking led to an improvement in the adiponectin level in healthy men with a normal weight (12) whereas observed that two months of participating in an aerobic training program with moderate intensity increased the adiponectin level (3). The study was undertaken
for several reasons. First, the results regarding the effect of aquarobics exercise program on the serum levels of adiponectin and IL-6 in obese women.

**Materials and Methods**

**Participants**

Twenty-four obese women aged of 46.49±1.41 years (Weight 76.41±3.11 kg, Height 155.4±1.5 cm, body mass index (BMI) 32.8±0.92) voluntarily participated in this study in Semarang, a cut-off for obesity BMI ≥30kg/m2, based on Asia-Pacific guidelines (13). Fasting glucose levels and blood pressure were determined in order to exclude the patients with metabolic disease. Postmenopausal women were screened with regards to the mean age of natural menopause in Central Java Province Indonesia women. In addition, the participants filled out questionnaires containing fields such as age, last menstrual day, menopausal status (e.g., last menstrual period occurred 6 months). All participants were informed the possible risk and the testing procedure of the trial before they signed the consent document. Participants were informed not to perform vigorous exercise one week before and during the trial. The study was approved by the Ethical and Research Committee of the Kariadi Hospitals (RSDK Semarang, Indonesia) before recruitment of the participants.

**Experimental Design**

This study aimed to investigated the effect of 12 weeks aquarobics exercise program on adiponectin and IL-6 serum in obese women. Participants were randomly divided into two groups including control and aquarobic groups. Before and after the exercise training, anthropometric measurements were examined for all subjects. Height and body weight were recorded and body mass index (BMI) was calculated from the ratio of weight (kg)/height (m2). Waist circumference was determined at the level of the natural waist between the ribs and the iliac crest at the end of a normal expiration. Body fat (%) was measured and blood pressure was measured on the right
arm with the subjects in a sitting position, twice, after a 10 min rest, using a standard mercury sphygmomanometer. Adipocentin plasma and IL-6 were measured before and 1 hour after the aquarobics treatment, as well as immediately after exercise challenge.

Aquarobics Exercise

Before aquarobics exercises, each subject's maximal oxygen consumption (VO$_2$ max) was measured to establish their exercise training intensity. The subjects were then not familiarized with aquarobics exercises, after which they were told the requirements for the present experiment and their VO$_2$ max was determined following the Bruce Protocol. Metabolic data were collected using open circuit spirometry (Sensor Medics VO$_2$max, USA). Aquarobics exercises, supervised by experienced aquarobics instructors, was performed three days a week for 8 weeks. Each session consisted of a 10 min warm up session, a 40 min session of aquarobics exercises an intensity of 50-75% of the predetermined. The exercise intensity was controlled using a belt heart rate sensor (polar beat), and at the end of each session, there was a cool-down period consisting of stretching for 10 min.

Biochemical measurement

Blood sample was collected from antecubital vein using heparin contained tubes and centrifuged at 3,000 rpm for 10 minutes at 4 °C. After centrifuging, supernatant was collected and stored at -80 °C until analysis. Plasma glucose levels were measured with a commercially available kit (glucose hexokinase kit, ADVIA 1650, radioimmunoassay RIA kit, Linco Research, St. Charles, MO, USA) (CV, 1.1% and 7.8–9.3%). Serum adiponectin was measured with a human adiponectin ELISA kit (BioVender, Laboratory Medicine, Brno, Czech Republic) (CV, 4.8%).
Blood samples for cytokine measurement were drawn into pre-cooled glass tubes containing EDTA. The tubes were spun immediately at 2200 g for 15 min at 4°C. The plasma was stored at -80°C until analyses were performed. For IL-6 measurement, high-sensitivity ELISA kits from R&D Systems (Minneapolis, MN, USA) were used. According to R&D Systems the IL-6 ELISA kit is insensitive to the addition of the recombinant forms of the soluble IL-6 receptor and the measurements, therefore, correspond to both soluble and receptor-bound cytokine. The intra-assay coefficient of variation (c.v.) was 5.9%.

Statistical analysis

Statistical analysis of the data was performed for each group using the means and standard deviations. Then, the Kolmogorov-Smirnov test was used to ensure that the data were normally distributed. All data shown represent the means±the standard deviation (SD). Differences in various parameters before and after aquarobics exercises were performed using the paired t-test. To demonstrate the aquarobics exercises-induced changes in adiponectin levels, we adjusted for the change in body weight. Changes in body weight were determined by calculating the difference in the body weights before and after aquarobics exercises. Differences between weight loss and weight gain were performed using independent the t-test, one-way analysis of variance (ANOVA) with the post-hoc Tukey HSD test was performed. To eliminate the possible influence of the baseline characteristics on the effects of exercise, adjustments for age, weight, BMI, body fat (%). All statistical analyses were performed using SPSS-PC for Windows (version 17.0, SPSS Inc., Chicago, IL, USA); Pb0.05 was considered statistically significant.
Results

While aquarobics performed twice day sessions of a 60-min and water immersion at 30 °C performed, control group remained at room temperature. The results of the current study showed an increase in serum adiponectin levels among subjects who underwent 8 weeks of aquarobics exercise program, with concurrent reduction in body weight, percent body fat, BMI, serum levels of adiponectin and IL-6 in the experimental group relative to the levels in the control group after 8 weeks of aquarobics exercise program. Participant characteristics are presented in Table 1. The result shows that the adiponectin levels in aquarobics exercise was significantly highest than that in the control group (Fig.1 p<0.05) and IL-6 levels significantly lower than that in the aquarobics (Fig.2 p<0.05).

The results obtained from the current study showed that 8 weeks of aquarobics exercise program decreased the percent body fat (P=0.01) and decreased the body mass index (P=0.00) relative to the control group. In addition, after 12 weeks of training, the serum levels of IL-6 (P=0.01) increased and the plasma levels of adiponectin (P=0.01) significantly increased relative to the level at the pre-test stage (before doing the exercise (P>0.05).

Discussion

In this research, the focus was to determine the effects of aquarobics exercise on the levels of adiponectin and IL-6. Appropriate levels of these factors in the blood can prevent diseases such as metabolic syndrome, type 2 diabetes and coronary heart disease. To this end, the levels of adiponectin and IL-6 were measured before and after the aquarobics exercise. The results of the present research showed 12 weeks of aquarobics exercise with moderate intensity can decrease the body fat percentage and the body mass index in obese women. Additionally, the results showed increase in the levels of IL-6 in the experimental group were significantly higher than the levels in the control group. Additionally, significant differences in these factors were observed in the experimental group between the pre-test and post-test.
Response Exercise on IL-6 levels

Exercise training involves multiple adaptations including increased pre-exercise skeletal muscle glycogen content, enhanced activity of key enzymes involved in the beta-oxidation\(^{(14)}\), increased sensitivity of adipose tissue to adrenalinestimulated lipolysis\(^{(15)}\), increased oxidation of intramuscular triglycerides\(^{(16)}\), where by the capacity to oxidize fat is increased\(^{(17)}\). As a consequence, the trained skeletal muscle is less dependent on plasma glucose and muscle glycogen as substrate during exercise\(^{(16)}\). Several epidemiological studies have reported a negative association between the amount of regular physical activity and the basal plasma IL-6 levels: the more physical active, the lower basal plasma IL-6. \(^{(18)}\) Basal plasma IL-6 is closer associated with physical inactivity than other cytokines associated with the metabolic syndrome.\(^{(19)}\)

Significant increase in the plasma levels of IL-6 in the experimental group after 12 weeks. These results were in line which reported a increase in the plasma levels of IL-6, as a result of aerobic training\(^{(20–24)}\).However, the findings of this research were differences among the studied groups in terms of race, training period, intensity, duration and type of training\(^{(3,5,25,26)}\). The amount of IL-6 produced by the active muscle is impressive, not only because of the small muscle mass that is active, but also because the workload, in relative terms, was as moderate as 70% of Vo2.max. It is not possible to transfer these high production values to models where a large fraction of muscle mass is engaged in the
concentric exercise. This is because when the exercise is confined to a relatively small muscle mass, the weight-specific power output is higher than in running or bicycling (Figure 3)(27).

In severely obese subjects, regular physical activity for 15 weeks reduces not only plasma IL-6, but also the IL-6 mRNA content in subcutaneous adipose tissue and in skeletal muscle(22). Overall, the combination of mode, intensity and duration of the exercise determines the magnitude of the exercise-induced increase of plasma IL-6. IL-6 may act locally within the contracting muscle during exercise or within the adipose tissue during recovery, while most other cells and target organs are exposed only to IL-6 released into the systemic circulation. Regarding the systemic effects of IL-6, the dose-response relationship and timing has to be considered(28). First, it should be noted that marked increases of plasma IL-6 only occur if the exercise involves a considerable muscle mass working for a considerable amount of time at a considerable intensity(29). Otherwise, a systemic IL-6 increase may be small or absent. Regardless, the exercise-induced peak plasma IL-6 concentration will usually not exceed 100 pg/ml. Second, the peak plasma IL-6 concentration occurs at the cessation of the exercise (or shortly after), thus the systemic effects induced by IL-6 are for the most part expected to occur during recovery from exercise (figure 4).

Response Exercise on Adiponectin levels

Previous studies reported aerobic training showed variable effects on changes in adiponectin levels. Numerous studies have found that exercise could increase adiponectin concentrations during weight loss(19). The present findings that an aquarobics exercise results a significant increase in plasma adiponectin levels with weight loss and even in the presence of weight gain in obese women. On the other hand, several studies found that aerobic training showed no effect on adiponectin levels under stable body weight (30) or even mild weight reduction(11,12). These findings confirm those of previous studies that found
improvement in insulin sensitivity after exercise training in obese and healthy individuals (11). Several mechanisms have been proposed to be responsible for the increases in insulin sensitivity after exercise training (31). These include increased post-receptor insulin signaling (32), increased glucose transporter protein and mRNA (33), increased activity of glycogen syntheses and hexokinase (3), increased muscle glucose delivery and changes in muscle composition (34). Restoring insulin sensitivity by circuit weight training might be mediated mainly by mechanisms other than adiponectin, for instance, by the AMP-activated protein kinase pathway (35).

Further, three sessions of aquarobics exercise within a one-week period were sufficient to maintain this increase for 1–3 days after the final exercise session. Study occurred in the absence of any changes in weight. As such, these findings add to the growing body of evidence showing that exercise results in important health benefits irrespective of changes in body weight (36,37).

The present research demonstrated a significant increase in the plasma level of adiponectin due to 8 weeks of aquarobics exercises in the experimental group compared with the control group. Moreover, a significant difference was observed in the plasma level of adiponectin in the experimental group between the pre-test and post-test stages. The increase in the plasma level of adiponectin as a result of 8 weeks of aquarobics exercises was most likely a preventive factor for diseases related to adiponectin (34,38). In this research, the increase in the level of adiponectin after adjusting to the aquarobics exercises was similar to the results of a number of previous studies. In a previous study, eight young obese women exhibited a significant decrease in fat after participating in an aerobic training programme for seven weeks; moreover, their level of adiponectin increased (39). Other studies found that training had no effect on the level of adiponectin. This discrepancy may be due to differences in age, sex, the type of training program and the intensity and duration of the training (40).
Finally, it seems that the amount of training can be a factor affecting the responses of plasma inflammatory markers adiponectin and IL-6 (41). Therefore, this study showed that aquarobics exercises leads to a significant increase in the levels of IL-6 and an increase in the level of adiponectin.
Conclusions

In summary, it can be concluded that aquarobics exercises decreases the risk of coronary heart disease by improving the plasma levels of adiponectin and IL-6, and therefore aerobic activity can be used as an effective non pharmacological treatment for preventing these diseases.

Acknowledgements

This study was partly sponsored by Ministry of Education and Culture, Republic of Indonesia

References


**Figure captions**

Table. 1 Physical, physiological and biochemistry variable in two groups

Figure 1. Plasma interleukin-6 (IL-6) before and after exercises. *P<0.05 vs Pre-exercise (Pre-test).

Figure 2. Plasma adiponectin levels before and after exercises exercises *P<0.05 vs Pre-exercise (Pre-test).

Figure 3. Mechanism of IL-6 releasing from muscle and Immune cells(42).

Figure 4. Effect of exercise duration and intensity on plasma IL-6 levels (43)
Table 1

Table 1. Physical, physiological and biochemistry variables in two group

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Aquarobics Group (n=12) (Mean ± SD)</th>
<th>Control group (n=12) (Mean ± SD)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year) pretest</td>
<td>46.74±1.30</td>
<td>46.79±1.35</td>
<td>0.450(1)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>1.55±0.05</td>
<td>1.52±0.04</td>
<td>0.075(1)</td>
</tr>
<tr>
<td>Weight (kg) pre test</td>
<td>75.66±5.54</td>
<td>75.41 ±6.61</td>
<td>0.269(1)</td>
</tr>
<tr>
<td>Weight (kg) post test</td>
<td>73.16±4.60</td>
<td>74.32 ±6.61</td>
<td>0.185(1)</td>
</tr>
<tr>
<td>BMI (kg/m2) pre test</td>
<td>31.32±0.97</td>
<td>32.48 ±1.56</td>
<td>0.040(1)</td>
</tr>
<tr>
<td>BMI (kg/m2) post test</td>
<td>30.24± 1.18</td>
<td>32.48±1.56</td>
<td>0.000(1)*</td>
</tr>
<tr>
<td>Fat percentage (%) pre test</td>
<td>31.58 ±1.94</td>
<td>31.80 ±1.57</td>
<td>0.031(1)</td>
</tr>
<tr>
<td>Fat percentage (%) post test</td>
<td>29.67 ± 1.22</td>
<td>31.76 ±1.65</td>
<td>0.001(1)*</td>
</tr>
<tr>
<td>Adiponectin (μg/ml - 1) pre test</td>
<td>5.11±0.65</td>
<td>4.92±0.45</td>
<td>0.011(1)</td>
</tr>
<tr>
<td>Adiponectin (μg/ml - 1) post test</td>
<td>7.72±0.65</td>
<td>4.99±0.46</td>
<td>0.000(1)*</td>
</tr>
<tr>
<td>Interleukin 6 (pg/ml - 1) pre test</td>
<td>0.358±0.156</td>
<td>0.420±0.183</td>
<td>0.048(1)</td>
</tr>
<tr>
<td>Interleukin 6 (pg/ml - 1) post test</td>
<td>0.744±0.114</td>
<td>0.347±0.179</td>
<td>0.001(1)*</td>
</tr>
</tbody>
</table>

(1) Oneway Anova

* denotes a significant difference between the experimental and control groups (p<0.05)
Figure 1

![Graph showing changes in Interleukin-6 levels before and after Aquarobics exercise compared to control group. The graph compares the levels of Interleukin-6 (ng/dL) before (Before) and after (After) the exercise intervention. The control group shows a slight increase, while the Aquarobics group demonstrates a significant increase, marked with an asterisk (*) indicating statistical significance.](image-url)
Figure 2

Before

After

Adiponectin (µg/dL)

Control

Aquarobics

*
Figure 3
Figure 4

A graph illustrating the relationship between time and plasma IL-6 concentration. Two curves are shown, one solid and one dashed. The solid curve represents a normal response with a high intensity but a short duration. The dashed curve indicates an increased intensity with a prolonged duration.
Development Models Hockey Games 25

Yan Indra Siregar, Ibrahim, Nurkadri*

ABSTRACT

This study aims to provide an alternative option to develop a model of the game "Hockey 25" as an attempt to contribute to the development of the game of hockey. The subjects in this study were athletes Indonesian Revival School Hockey Hockey Club assisted Unimed, who practiced at the University of Medan, North Sumatra.

The method used in this study is to use qualitative approaches and research methods development research & development (R & D). Based on the research and development approach, the method steps include: research gathering information, planning models, test the model, the revised model as well as validation and dissemination models.

Based on the results of the test instrument can be concluded that the model used is suitable to serve as a model to overcome the limitations of a hockey game in particular means a field hockey game in accordance with the standards of both the field hockey and indoor hockey. Under these conditions, drafted a model hockey game that is expected to be an alternative to a hockey game in North Sumatra.

Keywords: Development, Models, Hockey Games 25

CHAPTER I. INTRODUCTION

The development of hockey coaching and sports activities in Indonesia in the last 5 years shows rapid growth. Currently there is a trend that more and more hockey coaching activities taking place at universities and public and private schools. The increasing number of students and student participation is in line with many hockey championship between universities and student-level regional, national, and asean asia. Championship hockey include hockey lapagan (field Hockey) and hockey room (indoor hockey) between countries, clubs, colleges and students with a variety of age groupings.
Increased participation of students (college) and students (schools) it is still not followed with increasing field adequate infrastructure facilities according to the rules both at the central, regional, colleges and schools. Hockey game development today has reached a very wide circles of society. Development of hockey room (indoor) with 6 opposing players 6 which can be played at any time and is not hindered by weather factors, and mini hockey (minkey) a smaller field with fewer number of players.

* Dosen PKO FIK Unimed *

In North Sumatra, the game of hockey has long known. it is evidenced by the construction of a sports field flower garden in 1929 Sport bungna garden, covering the field: football, tennis court, and hockey is still there. One branch hockey dipertandingkannya not impact on PON XV, 2000 in Surabaya, East Java, causing a reduction coaching hockey in North Sumatra. In 2002 hockey events only one remains active in the North Sumatra Unimed State University Field Hockey Club. In 2004 Prequalification PON XVI Medan North Sumatra and PON XVI in 2004 in Palembang, South Sumatra. North Sumatra Hockey Team all the players are students of the State University of Medan were fostered at Unimed Hockey club activities.

Hockey success Northern Sumatra on PON XVI in 2004 won the gold medal women's team and a men's team bronze revival moment perhockeyan North Sumatra. Gratitude to God Almighty for the success of the Unimed Hockey Club shall develop an early age to establish School Hockey Indonesian Revival (Shib) on 26 November 2004, which focused on the field practicing State University field hockey, hockey schools foster extracurricular activities in the city of Medan. hockey club.
The result of the early age of coaching, Unimed Hockey Club has been able to contribute the best performance for the U-17 hockey team in North Sumatra that all athletes from Hockey School coaching Indonesian Revival at U-17 national championship in 2007 in Jakarta, the first winner sons and daughters, the player The best men's, men's and women's top score. Four athletes Shib Patronage Unimed Hockey Club also strengthen the national hockey team of students at the U-18 Hockey Championship in Kuantan Malaysia Asian Student 2006 At the Asean School Games 2010 in Kuala Lumpur Malaysia seven athletes Shib Indonesian students strengthen the hockey team.

Along with the running time, there was a dependence of coaching and training places and in this case less impact on sport activity tersosialisasinya activities undertaken since its activities are not confined to the school environment, also cause breakdown of the regeneration of players from these schools. This situation is very detrimental in terms pemassalan and development of the hockey game enthusiasts because of the reduced number of new players who also led into a low level of competition among athletes.

In general, these schools have a basketball court that is sufficient to be used, a basketball court-sized area of 28 mx 15 m tend to only be used to practice basic techniques alone, when to play the game or do not meet the conditions of the real game. The atmosphere and the playing conditions this is actually the main attraction as the dominant value to the game of hockey itself. When the game it leads to a real game it will have direct effect and is very useful for the improvement of his ability while playing field hockey and indoor hockey in official matches.

The research team is one of the faculty members in the Department of Nikken Unimed Coaching courses are pengampu basic hockey, hockey and specialization.
courses that include advanced hockey, hockey physical training methods, techniques and tactics training methods hockey, hockey coaching clinic, refereeing hockey, the learning process and also provide training, as long as this use is very representative field, but when they are alumni serving in the community means that the field is very difficult to obtain.

Based on the responsibilities and challenges of these researchers are willing to do the research to provide an alternative option to develop a model of the game "Hockey 25" as an attempt to contribute to the development of a hockey game, use the basketball court to play like a real hockey game.

CHAPTER II. LITERATURE

A. The concept of Model Development

Research development according to a research-oriented Dwiyogo to produce or develop a product, for example, to develop a model school sports, developed the physical education curriculum, develop strategies / methods of learning the sport, develop sports media learning, develop learning textbook exercise. The research process is circular or spiral development ranging from activity analysis, designing, evaluating and revising until the desired goal. The model is something that is a good example to emulate. Development of the model is an attempt to create a model and test the model in order to become worthy to be applied or replicated by other parties.

It can be concluded that the development is a research study that produces a product with a better level of effectiveness at the start needs analysis, product development and product testing. In this case study that will be developed is a model hockey game 25.
B. Concept / Theory Development Model

In connection with this study strengthens the theory, it is necessary to set out the results of relevant research variables in this study. The results of the study, which has links with variables of this study are as follows: Research conducted Awang Fajar Setiawan on kasbols game development for sport and physical education learning for the student health Unggaran MTs NU in 2010, concluded that kasbols games can be developed as a learning medium to small ball and junior high school students with an average of student interest in the game kasbols in the medium category which is 70% or 64 of the 90 students that kasbols game can be developed in different schools.

C. Nature of Hockey Game

1 Games Hockey

Study of history shows hockey game has been played more than 4000 years ago, this is evidenced by the presence of one of the reliefs on the walls of the tomb of Bani Hassan near Minia in Egypt were built around 2000 BC, shows a picture of two people doing pot as used in the game hockey. Historians have found indications that some of the structure of a hockey game played by the ancient Egyptians, Persians, Greeks and thousands of years before the first Olympics in 776 BC Then the Romans gave a great influence over the political and social domination of Europe at that time. In Mongolia, China, the cycle has played Beikou game that has some similarities with the field hockey for about 1,000 years ago.

2 Field Hockey

Hockey is a team sport that shaped the game over a rectangular field by using a stick, with a width of 55 meters and a length of 91.40 meters, played on a field called synthetic or turf field hockey (field hockey). Match international standards
using such synthetic pitch at the Olympic Games, world championships or tournaments under FIH official

![Field Hockey Field](http://www.fih.ch/files/Sport/Rules/Rulebook 2010-11).  

Field hockey is a game of two teams each team 11 players using a stick to hit the ball on the ground. The purpose of the game is to hit the ball into the opposing team's goal. The team that scores the most goals won declared the winner. Hockey game at a high level requires a high ability also includes technical ability, physical, and mental tactics and strategies. In addition, players must understand the rules of the game, the game and refereeing.

**3 Hockey Room**

Hockey room (indoor hockey) was developed in Germany since the 1950s, and the fastest growing in Europe. Fédération Internationale de Hockey (FIH) recognizes the indoor hockey hockey game in 1968 under the auspices of the room that first played in 1972 FIH World Cup hockey first room held in Leipzig, Germany in 2003 and to date has not competed on the indoor hockey Olympics.

Hockey indoor field hockey is different from a few things:

1. Playing field is smaller than the field hockey field., With a field size of 18-22 x 36- 44 m.
2. Line 9 meter circle.
3. Field 3 is made of wood or synthetic materials.
4. Side beams on the two long sides of the field with a slightly sloping surface to push the ball bounced down.
5. Hurdles smaller than field hockey goalkeeper with a height of 2 m and a width of 3 m.
6. A team consists of 6 players on the field, with a maximum of 12 players maximum per team.
7. When the game 2 x 20 minutes for men and women.
8. Not allowed to use the technique hits, just push for passing, while shooting can use the push, flick, scoop or reverse Push and reverse flick.
9. Ball with a smooth surface.
10. Stick is lighter and thinner than the field hockey stick.

**4 Variations Hockey Game**

The development of a hockey game in various countries encouraging the creation of many variations of the game of hockey as an effort to approach the development of the game of hockey to be played among a wider, by changing a few rules, patterns of play, play facilities and infrastructure, it is very help increase the popularity of the game of hockey without changing the shape characteristics. Hockey game variations include:

a. Mini Hockey
b. Hockey Sixes
c. Field Hockey Mini in Indonesia

**D. Design Models Hockey Games 25**

Hockey game 25 is a modification of the game of hockey room by two teams played each 5 people in the field with a width of 25 m and 14 m long with a beam side and the center that serves as a boundary line and reflection as well as the use of the wicket, so this game can be carried out in the field about the size of a basketball court in high school and college, with the following analysis:
1. Field

Rectangular-shaped field, with a length of 14 meters and a width of 25 meters with a beam of side length limit field and the back line marking the edge of the field width. There is only one net width of 3 m and a height of 2 m.

The field hockey field resembles a room with approximately one-third the size of the field next to the goal as shown below:

![Field Hockey Diagram](image)

Figure 2 Field Hockey 25
Source: Research Design

2. Gaming equipment

Hockey game 25 using sticks used for hockey games room with the same equipment goalkeeper with a field hockey or hockey room and use the ball as a ball on a hockey room.

3. Basic techniques of the game.

Hockey Games 25 using basic techniques in playing the lead covering, holding / receiving, pass (push technique), shots on goal by using the push (push), the flick (flick), shovel (scoop) with a forehand or reverse position. Thus the basic techniques of the game Hockey 25 is equal to the basic techniques of the game of hockey room.
4. Game Rules

Hockey game 25 use the same rules to the 2011-2013 indoor hockey rules issued by the FIH except some thing special rules. The terms and concepts used in the game of hockey 25 are as follows:

1. Player is a participant in the team.
2. The team is a team of up to ten people, consisting of a maximum of five field players and five substitutes.
3. Field players is a participant in the field of play other than the goalkeeper.
4. Goalkeeper is a participant of each team on the field wearing full protective equipment consisting of at least headgear, leg protectors and also kickers and hand protectors and other protective equipment.
5. The player field that features goalkeeper is a field of players who do not use the equipment goalie keeper has the privilege, by using a special mark on the same costume with the color of his costume.
6. The attacker is a team (player) who is trying to score a goal.
7. Defender is a team (players) who are trying to prevent a goal.
8. Rear line is the line width of the field where lies the boundary of the goal (25 yards).
9. Behind the goal line is the line between the goalposts.
10. Beam is the beam short side is on the right and left field (14 meters).
11. Central beam is the beam length on the side facing the middle in front of the goal line (25 meters).
12. Circle (circle) is an area surrounded by and including the semi-circle and the line connecting the two at each end of the field adjacent to the midpoint of the line and back.
13. The player plays the ball field by stopping, diverting direction or move the ball with the stick.
14. Encouraging (Push) is moving the ball on the ground surface using a pushing motion stick, the stick is placed close to the ball. When the pushing motion carried, either the ball or the head of the stick should touch the ground surface.
15. Flick (Flick) is pushing the ball, causing the ball bounced over the surface of the ground.
16. Hit (Hit) is hitting the ball with a stick swinging motion. not allowed in hockey game 25.
17. The shot made a goal is scored the attacker to act by playing the ball towards goal from inside the circle. The ball may not be precise on goal but the action is still considered to be "shot to make goals" if the intention of the player is doing shots on goal.
18. Distance game (Playing distance) is the distance in which a player can reach the ball to play.
19. Movement block and grab the ball (Tackle) is action to block the opponent and win the ball.
20. Abuse is an act that is contrary to the regulations may be penalized by the referee.

CHAPTER III. RESEARCH OBJECTIVES AND BENEFITS

A. PURPOSE OF RESEARCH

The purpose of this study is:

1. Identify and analyze the problems faced by teachers / coaches / trainers in conducting extracurricular activities at school hockey.
2. Development of products that comply with the problems faced by schools.
3. Develop models of hockey games that are tailored to the problems faced by school.

B. BENEFITS RESEARCH

The benefits of this research are:

1. Can identify and analyze problems faced by teachers / coaches / trainers in conducting extracurricular activities at school hockey.
2. Can develop products according to the problems faced by school.
3. Can develop customized models of hockey games with the problems faced by school.

CHAPTER IV. RESEARCH METHODOLOGY

This study used a qualitative approach and research methods development research & development (R & D). The first stage is carried out analysis of the problem, this phase begins with activities in conducting theoretical and empirical
studies to identify the problems faced by teachers / coaches / trainers in conducting extracurricular activities at school hockey, at this stage identified some of the problems faced by teachers / coaches / trainers in conducting extracurricular activities at school hockey. Data were collected from 5 schools namely, MTS School 2 Medan, Medan SMP 27, SMP Negeri 8 Medan, SMA 3 Medan and SMK 9 Medan.

This study obtained data begins with activities in conducting theoretical and empirical studies to identify the problems faced by teachers / coaches / trainers in conducting extracurricular hockey in high school and college. Studies carried out by studying the theory of reference sources associated with the problem, and the empirical study is based on the fact that occur in the field during this through direct experience encountered by one of the members of the research team as an adviser / coach and hockey pengampu courses and observation and open interviews.

The population in this study Indonesian athletes Hockey School Hockey Club Revive built Unimed, who trained at the University of Medan, Medan, North Sumatra. The instrument used in this study is to use a questionnaire to the teacher / mentor / coach athletes Indonesian Revival School Hockey Hockey Club Unimed assisted in the analysis of the needs and input as well as the opinion of the athletes on the first test a small group of as many as 10 athletes.

In this study, the data analysis technique used is quantitative descriptive analysis with percentages.
CHAPTER V. RESULTS ACHIEVED

The results of the implementation of this study is that there is dependence hockey coaching and training places and this affects less socialized activities performed sport activity because the activities are not confined to the school environment, also led to the dissolution of the regeneration of the players from those schools. This situation is very detrimental in terms pemassalan and development of hockey game enthusiasts because of the reduced number of new players who also led into a low level of competition among athletes. So based on these models can be designed hockey 25 which can be used as an alternative to a hockey game that can be played on a field that has existed in schools or universities to conduct development activities and implement the game environment.

The activities performed during the execution of the study are: (1) The first step is the analysis of the problem is done, this phase begins with activities in conducting theoretical and empirical studies to identify the problems faced by teachers / coaches / trainers in conducting extracurricular activities at school hockey-school, (2) trials to produce a draft of a model 25 hockey game.

CHAPTER VI. NEXT PHASE PLAN

Plan the next stage (second) is to conduct studies related to the model theory hockey game 25, after experts evaluated, then revised the first phase of the data obtained is used as the basis to produce the final model hockey game 25.

To make this product the necessary consultation and focus group discussions with several experts / scholars / scientists include: (1) expert hockey game (2) expert rules hockey (3) sports experts, in order to produce a satisfactory product. At this second stage will also be tested, test products made to collect data that is used as a basis for establishing eligibility to test and develop products, whether or not the
product can be understood. All data collected at this stage is used to improve products, so that it becomes a viable product used in the actual scene.
CHAPTER VII CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSION

Based on the results of research conducted, it can be concluded that the school environment as an extracurricular activity center has not empower the existing basketball court at the school for coaching hockey, this affects less tersosialisasinya sport activity activities carried out because the activities are not confined to the school environment, also led to the dissolution of the regeneration of players of these schools. This situation is very detrimental in terms pemassalan and development of hockey game enthusiasts because of the reduced number of new players who also led into a low level of competition among athletes.

B. ADVICE

Based on the conclusion of the study, the researchers propose the suggestion that research Hockey Game Model 25 can be continued at a later stage.
REFERENCES


http://en.wikipedia.org/wiki/Minkey


The Role of Reinforcement and Punishment and Student Motivation in Learning Physical Education, Sports and Health

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Abstract

The article will reveal how the role of reinforcement and punishment to motivate children to learn on the subject of physical education and sport health in schools (penjasorkes) . This is important , because it has been rarely being found to balance the two roles are enforced . Teachers penjasorkes tendency to let or simply thinks it is normal when students make the right moves . But if one of the students violated penjas teachers will easily suspend the student as usual today. For example students were told to Push Up , Sit Up , Running around the field and others . Penjas teachers rarely provide a form of punishment if the motion that leads to self courage , strength of character and positive motivation. So It does not create a negative air thinking students towards subjects penjasorkes. It turned positive and penjasorkes subjects like existence . The content of reinforcement and punishment will be authors describe in the article below .

Key words : Reinforcement and punishment, Physical education and sport health

A. Introduction

Backgrounds

Education is a human effort to expand the horizon of their knowledge in order to establish to value , attitudes , and behaviors . In an effort that not only produced great benefits , education is also one of the basic human needs are often perceived has not met expectations . That's because the traditional teaching method focuses on the imposition , namely teaching by pouring the things that are considered important by the teacher to the student (Hamalik , 2007) . This method does not apply if the material was appropriate given subjects or not the ability , needs , Interests and level of development and
understanding of students. This method also does not pay attention to whether the materials were given were based on motives - motives and purpose stated in pupil. In the teaching and learning activities, students sometimes do not show the expected behavior as well as the students looked lethargic, quiet, do not pay attention to what is conveyed by the teacher. Then it needs to be investigated factors because. The because is usually derived from several factors, such as students feeling forced or scared of his teacher, the student is ill, hungry, or having personal problems and others. This suggests that students do not have the passion or affection aroused not to perform an activity in the core of teaching and learning so that learning is not conveyed to the fullest. In connection with this, the educator is expected to be able to apply the learning patterns that can motivate students learning. So one of the important task of a teacher is to motivate the students themselves. Motivations is the basic impulse that drives a person to behave. This was the impetus that drives a person to do something that fits with the urge in him. Therefore, the act of a person based on a certain motivational contains the theme of the underlying motivation. Motivations can also be regarded as the difference between able and willing to carry out execute. Motivations closer to wanting to carry out tasks to achieve the goal. The Motivation is the force, both from within and from outside that encourages one to achieve certain goals that have been set previously. It also greatly affects the motivation to learn self-learners because it can lead to the intention of learning to ensure continuity of learning activities. Someone who has a high learning motivation is a person who has a need to achieve optimal learning outcomes. In motivating learners, educators active roles are very important. One of the
things that can be done by an educator to motivate learners are awarded when
the student participants could answer questions about the teacher, either by
way of giving a gift or a great value.

B. Discussion

1. Definition of Reinforcement.

According to Paul Chance (in Khanifah 1991, 29) defines reinforcement as
follows, "Reinforcement is the procedure of increasing the likelihood of a
behavior by following it with some positive consequences" (1979, 86). It is
said that the reinforcement (reinforcement) is a procedure in an increased
likelihood of behavior by individuals with some positive consequences.
According to Mahmud Dimyati Reinforcement is a consequence that
strengthens behavior. It says that behavior followed by reinforcement
(reinforcement) will be repeated at a time when that will come. An event that
strengthens the behavior it could menyenagnkan or unpleasant.
Reinforcement can also be called the "reinforcement is a positive response to
a particular behavior of students who allows such behavior arises again"
(Buchari, 2008, 30). Reinforcement is an important element that affects the
act of learning. The forms of reinforcement learning are praising and reward.
A renowned expert on eksperimenya or legal Thorndike named due to legal
(law of effect), states that tend to be repeated rewarded responses to certain
situations, while the response is not given awards tend to be repeated. With
the result of this law mean the awards at a student in learning are very
important in the success of learning. From the definition of would be to say
that the reinforcement is a boost or extrinsic motivation that is often used by
teachers to stimulate student interest. So he explained that the reinforcement
is synonymous with extrinsic motivations. What is meant by extrinsic motivation according Sumadi Suryabrata are motifs that function as there are external stimuli. For example, a student will study hard because being told that soon will be implemented to test or a student learning English in order to get a diploma or a teacher to know the commands. Thus the main purpose of the individual performing the activity is to achieve the goal that lies beyond the learning activities themselves or the purpose of the activity was not involved in the study. The award as reinforcement learning (reinforcer) may be given after the occurrence of a response. After working on a problem with the right, such as teachers also write awards to students by giving words of praise. B Discussion 1 Definition of Reinforcement. According to Paul Chance (in Khanifah 1991, 29) defines reinforcement as follows, "Reinforcement is the procedure of increasing the likelihood of a behavior by following it with some positive consequences" (1979, 86). It is said that the reinforcement (reinforcement) is a procedure in an increased likelihood of behavior by individuals with some positive consequences. According to Mahmud Dimyati Reinforcement is a consequence that strengthens behavior. It says that behavior followed by reinforcement (reinforcement) will be repeated at a time when that will come. An event that strengthens the behavior it could menyenagnkan or unpleasant. Reinforcement can also be called the "reinforcement is a positive response to a particular behavior of students who allows such behavior arises again" (Buchari, 2008, 30). Reinforcement is an important element that affects the act of learning. The forms of reinforcement learning are praising and reward. A renowned expert on eksperimenya or legal Thorndike named due to legal (law of effect), states
that tend to be repeated rewarded responses to certain situations, while the response is not given awards tend to be repeated. With the result of this law mean the awards at a student in learning are very important in the success of learning. From the definition of would be to say that the reinforcement is a boost or extrinsic motivation that is often used by teachers to stimulate student interest. So he explained that the reinforcement is synonymous with extrinsic motivations. What is meant by extrinsic motivation according Sumadi Suryabrata are motifs that function as there are external stimuli. For example, a student will study hard because being told that soon will be implemented to test or a student learning English in order to get a diploma or a teacher to know the commands. Thus the main purpose of the individual performing the activity is to achieve the goal that lies beyond the learning activities themselves or the purpose of the activity was not involved in the study. The award as reinforcement learning (reinforcer) may be given after the occurrence of a response. After working on a problem with the right, such as teachers also write the award to students by giving words of praise.

2. Rewards

In Learning Process. Marno and M. Idris (2008) mentions in his book that in general, the award has a positive influence on people's lives, which can encourage a person to improve his behavior and improve his business. Not obtaining awards would reduce or even negate the behavior in a person. So even in the learning process. Students who excel will maintain his performance when teachers reward the achievement. Even with a given teacher appreciation, arise a strong motivation to improve achievements.
1) The purpose of granting Strengthening Reinforcement if do in a way that is appropriate and effective achievement of the principle intended use. The purpose of the use of reinforcement (Marno Dan M. Idris, 2008, 151) is,

a. Increasing the attention to students in the learning process.
b. Generating, maintaining, and improving students' motivation.
c. Direct the development of students' thinking toward divergent thinking.
d. Organize and develop their own child in the learning process.
e. Control and modify the behavior of students who are less positive and mndorong emergence of productive behavior.

2) Component Skills Reinforcement. Some of the components that need to be understood and controlled by teachers or teacher candidates, so that he can provide thoughtful and systematic reinforcement (Buchari, 2008, 31) is,

a. Verbal Reinforcement, Comments expression, In the form of praise,
   1) The words, good, great, great once, right once, very thorough and so on.
   2) Sentence, a) It was a good thought b) Once a critical way of thinking c) Thank you very good.

b. Gestural Reinforcement, 1) the Face, a smile, raised eyebrows, laughing, whistling, leering eyes 2) Limbs, clapping, pointing,
sign ok, raise your hands, nod, shake of the head (surprise), lift your shoulders up.

c. Proximity Reinforcement, walked over, standing near, sitting near the group, standing among the students.

d. Contact Reinforcement, Pat shoulders, back, hands on head, handshake, holding the hair, raising hands students. In this case must be considered local customs. There taboo holding cheeks, holding the head and so on.

e. Reinforcement activity, walking ahead, share materials, leading games, Helping the students in the use of AVA (OHP) listening to music, radio, TV.

f. Token Reinforcement, Giving gifts, stars written comments on the book work, the name of honor, stamps currency badges, pictures, certificates, trophies, values and so forth. Provide reinforcement of learning activities seems simple, that signal approval of teachers to student behavior, which is expressed in the form of, among others, the words justify, praise, a smile, a nod, or give the gift of material, however this skill difficult if the teacher does not understand the meaning to be achieved in a given skill reinforcement. For this purpose the strengthening of skills need attention, because a positive response was given the award for the student teacher demonstrate positive behaviors (achievement in learning). With such a positive response, In turn motivate children to maintain the achievements (Marno Dan M. Idris, 2008, 150). Therefore reward plays an important role in the lives of students who later will affect the learning process of a source of motivations for learning. 

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3. Form of Giving Award Prize

Awards in the form of gift-giving, can also be done by teachers in certain limits. For example, at the end of the year gift of students who have or show good learning outcomes, provide prizes for the winners of the contest or sporting events while the meaning of the gift is "Giving, reward (in the race to win a contest, game, etc.)" (general Dictionary Indonesian, 2001, 482). Sardiman (2007, 92) argues that the gift can also be said as the motivation, but it is not always the case of a reward for a job, may not be attractive to someone who is not happy and not be talented to do such work, as an example of a gift given to image the best may not be attractive to someone of students who do not have the talent to draw, while the prize example can be a variety of food, money, certificates, trophies, souvenirs, etc.

4. Forms of Giving Value Awards

Generally, every student wants to know the results of his work, which is a number assigned by the teacher. The student who gets good numbers, will encourage learning motivation becomes larger. Instead students are getting bad grades may cause frustration or can also be a driving force in order to learn better. According Sudijono (1996: 311), the value is a number (can also text), which is a result of the change scores that have been put together with other scores, as well as customizable settings with a particular standard.

Value, basically is a number or letter that symbolizes how far or how much capability has been demonstrated by the testee materials or materials in dripping, in accordance with the specific instructional objectives that have been defined. This means that more and more number of items can be
answered with a yes, then the award given by the teacher to the student will be higher. Conversely, if the number of grains of items that can be answered correctly it just a little, then the award is given to students are also small or low.

Sardiman (2007: 92) argued that in this figure as a symbol of the value of their learning activities. Many students learn, which is the main fact to reach a good number or value so that students usually pursued is the replay value or values in the figure rapot well. Values both for the students is a strong motivation. But there are also, even many students work or study just want to pursue a course grade anyway.

It shows the motivation it has less weight when compared with students - students who want a good value. However it must be remembered by the teacher that the achievement of such figures have not forgotten the true learning outcomes, learning outcomes are meaningful. Therefore, the next step taken by teachers is how to provide the figures can be attributed to the values contained in each of the knowledge that is taught to students so that not only cognitive but also skill and affection. While the assessment is also called the evaluation according to Don R. Kirkendall et al is: an attempt to compare the measurement results to a comparison or certain patokkan (Sukarjo, Nurhasan:)

1. The principles of evaluation

a. Objective, meaning that the evaluation must be based on tangible evidence, should not be based on memory alone, this means having to go through tests or exams.
b. In accordance with the objectives, the evaluation must be clearly measure the learning outcomes that have been established in accordance with the instructional goals.

c. Covers shape matching test, meaning that the evaluation covers the forms must be validated tests to evaluate learning outcomes.

d. Can be used for repairs, meaning that the evaluation should be used to improve student learning ways.

e. In accordance with the teaching materials, meaning that the material is arranged in the test items should be adjusted with the teaching material.

2. Approaches the value.

There are two types of assessment approaches that can be used to interpret the scores into value. Both of these approaches have goals, processes, standards, and will also result in different values.

That is why the selection of the appropriate approach to be used is important. Both approaches are: Normal Reference Approach (PAN) and the Reference Approach Patokkan (PAP)

1) Reference Norms Approach (PAN), Norm Reference Test (NRT)

In his book Muhibbin PAN assessment approach (approach reference norm), the learning achievement of students is measured by comparing the achievements of friends or a group of their classmates. Thus, scoring or value of such learners refer to the results of the comparison between the scores obtained by group of their friends with the score itself. As disclosed in the above website
In the standard approach to benchmark the performance of the used norm is relative. This means that the level of performance of a student is determined based on the relative position in the group. The level of performance of a student is very dependent on the conditions of the performance of the group. In other words, a standard measurement used is the norm group. One of the advantages of this is the relative standard placement scores (Performance) students performed regardless of the difficulty of a test carefully. Disadvantages of the use of the relative standard include:

a. Considered unfair, because for those who are in classes that have high scores, should strive to get higher scores to get an A or B. This situation be good motivation for some students.

b. Relative standard create unhealthy competition among the students, because when a person or group of students got an A will reduce the chance of the other to get it.

Example:

One group of participants the test consisted of 9 people got a raw score: 50, 45, 45, 40, 40, 40, 35, 35, 30. By using the PAN approach, the test participants who received the highest score (50) will have the highest value, for example 10, while those who score below it will have value in proportion, 9, 9, 8, 8, 8, 7, 7, 6. Determination of the value of the score above can also be calculated in advance the percentage of correct answers. Then the highest percentage given the highest score.
2) Reference Benchmark Approach (PAP), Criterion Reference Test CRT)

PAP is an assessment approach that compares the measurement results of a student with a benchmark or pass limit, which is the minimum mastery first set before the learning process. PAP is also called "Criterion Referenced Evaluation or the Absolute Standard". At the approach of the benchmark reference, the performance standards that are used are absolute standards (Sukardjo and Nurhasan, 1992: 8).

To get an A or B, a student must earn certain scores in accordance with the limits determined without being affected by the performance (scores) obtained by other students in the class. One of the drawbacks to using absolute standard is student scores depend on the difficulty level of the test that they receive. This means that if the tests which a student is very likely the student will get an A or B, and vice versa if the test is too difficult to be solved, then it is likely to earn an A or B becomes very small. However, this drawback can be overcome by taking into account the objectives to be strictly measured levels of achievement.

It is also disclosed in the above website (http://blog.persimpangan.com/blog/2007/08/14/konsep-basic-evaluation-results). In interpreting raw scores into values using PAP approach, the criteria determined in advance of graduation with a passing grade boundaries. Generally, the criteria values used in the form of a score following ranges:

<table>
<thead>
<tr>
<th>Value Score Range</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% s.d. 100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70% s.d. 79%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60% s.d. 69%</td>
<td></td>
<td></td>
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</tbody>
</table>
5. Punishment.

The punishment the action gives an unpleasant stimulus as a punishment for doing something that is not right or because they failed to do something that is of interest and any form into stimulation that is given to someone who is perceived as unpleasant and usually try to avoid.

6. Motivation

1) Definition of the motivation.

Traditional teaching method focuses on the imposition, namely teaching by pouring the things that are considered important by teachers for students. This method does not consider whether a given lesson material was appropriate or not the ability, needs, interests, and level of development and understanding of students. Not also be considered whether the materials supplied are based on the motives and purpose stated in pupil. (Hamalik, 2007, 157) Thus are the case, the student teacher can impose learning materials to them, but the teacher will not be able to force him to learn in the real sense. This is the most heavy duty teacher how to try to make students want to learn and have the desire to learn continuously. According to Mc. Donald motivation is, the energy change in person who is characterized as the emergence of "feeling" and preceded by a response to any destination (Sardiman, 2007, 73). This was the impetus that drives a person to do something that fits with the impulse in him, therefore one's actions and are based on certain motivation contains a theme according to the underlying motivation.
2) Functions of motivation.
From the description of it is clear that the motivation to encourage the emergence of behavior and affect and change the behavior, So it includes the following functions motivations leading to the conduct or an act without motivation then there will arise an act such as learning (Hamalik, 2007, 161), namely,

a. Motivations serves as a steering means directing actions to meet the desired objectives.
b. Serves as a means of motivation pengerak it serves as an engine for large cars kecinya motivations will determine a fast or slow work.
c. Serves as a motivation to encourage the emergence of a behavior or action. Without motivations will not act like learning something arise.

3) The types of motivations.
Based on the understanding and explanations of motivation that have been discussed above, In principle motivations can be divided into two types, intrinsic motivation and extrinsic motivation

a. Intrinsic motivation.
Intrinsic motivation is motivations in learning situations that include and meet the needs of student goals. A Motivation is often also called pure motivations. Real motivation that arises the students themselves, such as the desire to have certain skills, gain information and understanding, develops an attitude to succeed, please life, the desire is accepted by others, and others. So this motivation arose from influence over outside. Intrinsic motivation is the motivation that lives within the student and useful in learning situations functional. In this case the praise or reward or the like is not needed because it will not because students to work or study for a compliment or a gift.

b. Extrinsic motivation.
Extrinsic motivation is the motivation that is caused by external factors of the number of credits the learning situation, diploma, degree prize, medal contention and extrinsic motivation punishment a necessary thing in school, because not all of the lessons in the school of interest in students. Sometimes students do not understand what is actually learning it's therefore the
motivation to learn it is very necessary, so that the child is willing and eager to learn. Of course in this case the teacher should strive to motivate students to want to learn. For example, a person is learning, knowing there will be a test tomorrow morning with the hope of getting a good value, so it will be praised by his girlfriend or his friend. So it is important not because of learning wants to know something, but want to get a good grade, or in order to get the prize. Therefore, extrinsic motivations can also be regarded as a form of motivations in which learning activities initiated and forwarded by encouragement from outside that is not absolutely related to learning activities.

4) Efforts to increase motivations in learning.
In order for the desired teaching objectives, especially by teachers as a teacher, it is necessary to businesses, to enable the effective learning activities and student membelajarkan well. To raise students’ motivation, teachers can perform a variety of ways as follows,
   a. Values
   b. Give to praise
   c. Gift-giving
   d. Working group
   e. Competition
   f. Assessment
   g. Educational film
   h. Learning through radio.

C. Closing
Similarly, article that we put this simply, hopefully beneficial and can be an added value in the window horizon of our knowledge. We realize that in this paper is not perfect or there are a lot of mistakes and errors, so we are hoping to all readers to be able to contribute suggestions, criticisms and questions that if it builds. Finally I would like to thank all the ladies and gentlemen who have given me the opportunity to present this article.
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Literacy.
ROLE OF MANAGEMENT TO LEARNING ACHIEVEMENT OF STUDENT OF FACULTY OF SPORT SCIENCE OF MANADO STATE UNIVERSITY

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ABSTRACT

Management is an integral part of various things. Where is the good management can improve the system of work performed including improving student achievement. The goal is to help every one in order to organize and develop learning activities that are run by good management. As for the formulation of the problem in this study is how the role of management on student achievement in Sport Science Faculty Manado State University.

This study used a qualitative approach to the research subjects consisting of sport science faculty students. The technique of collecting data through observation, interview and documentation. The variables in this research that the faculty management and sport science achievement of students.

The results showed a course management was instrumental to the achievement of students. Calculation results show that the coefficient of management courses on learning achievement (p41) =0.329 $t_{count} = 3.609$. Because $t_{count} = 3.609$ and $t_{table} = 2.403$ at $\alpha = 0.01$, $t_{count} > t_{table}$, therefore $H_0$ is rejected, which means that there is a direct positive influence management courses to the studentachievement.

The implementation of good management can improve learning achievement start of the registration process, the implementation classes, midterms and semester.
Implementation of management are well run course there are results that can be achieved as a form of management success in raising achievement. Achievements of the students indicated by the increase in the average value of the cumulative grade point

**Keywords**: Role management, Learning Achievement

**INTRODUCTION**

Improving the quality of education will be achieved if the teaching and learning process in the classroom held totally effective, efficient and useful to achieve the capability, knowledge, attitudes and skills expected. One of theoretical success factors in the management of teaching and learning is effective and efficient, because the learning process is more dominant in the classroom. It is therefore a very influential role in the management of teaching and learning, with good management it will have an impact on the achievement of good anyway. Because basically the process of teaching and learning is at the core/essence of the educational process as a whole, including the teaching staff is one of the important factors in determining the success of teaching and learning in the classroom. Therefore, teachers are required to enhance the role and competences, competent teaching staff will be able to create an effective learning environment, efficient and will be able to manage the class so that student learning outcome sare at the maximum level.

Learning is essentially an effort, a process of behavioral changes that occur in the individual as a result of experience or the result of its interaction with its environment. Change the results of this study deals only with the addition of skills, skills, attitudes, understanding, self-esteem, interests, character, self-adjustment. But is also associated with changes in the response patterns of all aspects of one's personality that has made learning activities. Learning is the most important thing to do man to face ever-changing environment, therefore one should prepare himself to face life with a dynamic and competitive learning, in which they include learning to understand yourself, understand change, and development of globalization. Therefore, studying a person’s readiness to face the times are so rapid.

Intellectual ability of students to determine the success of students in acquiring achievements, to determine a person's success or failure in learning it is necessary to
evaluate, aim to determine student achievement obtained after the learning process takes place. Student achievement results obtained can be interpreted as the existence of learning activities that have been performed. Learning achievement is inseparable from learning because learning is a process, while achievement is the result of the learning process. The factors that affect the achievement of students have appeared in the field, especially on learning achievements either external factors or from the internal factors. One of which is the management, without exception sport science faculty students Manado state university. Course management functions are very basic because the activities of teachers in classroom management includes managing student behavior in the classroom, to create and manage socio-emotional climate of the group process, so that the success of the teaching force in creating the conditions that allow, indicator learning process takes place effectively. Therefore, in line with the government's efforts in improving the quality of education at all levels, the application of learning strategies in the classroom management is one of the alternatives that we believe can be used to solve the fundamental problem of the existing educational problems and can improve the achievement of students. Therefore, researchers interested in studying about the learning performance from the perspective of management contained in the faculty of sport science Manado state university.

According to Asep Jihat (2009: 1) learning is a process and an activity that is very fundamental element in the implementation of the type and level of education. Whereas Sardiman (1996: 22) studied the behavior or appearance with a series of activities such as reading, watching, listening, imitating and so on. Learning achievement is often referred to as learning outcomes which means what has been achieved by a student after Study abroad activities that include cognitive, affective and psychomotor (Tohirin, 2005: 151). According Oemar Hamalik (2003: 146) to determine the extent to which student achievement it is necessary to measure the:

1. Assessment is a series of activities designed to measure learning achievement (achievement) of students as a result of an instructional program.

2. Measurement with respect to the collection of descriptive data about a product or behavior of students and the students, and relationship with performance standards or norms.

Learning achievements a phrase consisting of two words, namely; "Achievement" and "Learning". The word "Achievement" and "Learning" has a different meaning. Achievement is the result of an activity that has been done created either individually or in groups. Achievement will never be produced as long as someone has never done an activity. Achievement is not easy, but we have to face many hurdles and obstacles
with perseverance and optimistic just left alone, can help to achieve. Learning achievement was stated by Moh. Surya (2004: 75), "learning achievement is the result of learning or behavioral changes related to knowledge, skills and attitudes after a certain process, as a result of individual experience in the interaction with the environment".

In Big Indonesian Dictionary (2001: 895) "Performance Study is the acquisition of knowledge or skills developed through subjects, usually indicated by the value given by the teacher". Meanwhile, according to Winkel (Sunarto, 2012) learning achievement is a testament to the success that has been achieved by someone. Therefore, learning achievement is the maximum yield achieved by someone after carrying out efforts to learn. Arif Gunarso (Sunarto, 2012) suggests that learning achievement is the maximum effort achieved by someone after carrying out efforts to learn. Achievement can be measured through tests that are often known as learning achievement tests. Meanwhile, according to Muhibbin Shah (2008: 141), "Learning achievement is the result of some of the factors that affect the overall learning process."

Frame of this study is that every organization has a management that involves all the potential involved in the organization. Likewise, the faculty of sport science Manado state university as an organization, then the manager is one of the important elements that can determine success. The knowledge of management is essential to the management of the education process can be run effectively and efficiently. With the knowledge, managers will certainly simplify the process of planning, implementation, monitoring, and evaluation of all programs that have been established, in order to facilitate the duties and functions of managers in the management of the entire work plan. If manager have a good knowledge, believed to be able to improve their students' learning achievement. Hypotheses derived from the theoretical description and the frame of the management courses directly influence student achievement in sport science faculty Manado state university.

**METHODS**

The purpose of this study was to determine whether there is influence of management on student achievement in sport science faculty Manado state university.
The study was conducted at faculty of sport science. Implementation of the study was in February 2014 through July 2014. The research used a qualitative approach with descriptive method that aims to describe the role of management in sport science faculty on student achievement. The variables of this study was the management in sport science faculty (X) and student achievement (Y). The population in this study were all students in the faculty of sport science in 2014. The sample used in this study were 50 students of the faculty of sport science, which was taken from the Department of Physical Education, Sport Coaching Education major and majoring in health education and recreation. The technique of collecting data through observation, interview and documentation. Learning achievement referred to in this study were student achievement index with indicators of academic achievement. While management is the result of student assessment in the form of knowledge, memory, understanding the application, synthesis and evaluation of the management of planning, organization, directing and controlling. The instrument used in the form of indicator variables management can be developed in a grain of instruments as much as 54 items. The validity and reliability was obtained with test instruments performed on 40 people. Calculations using the Pearson Product Moment. The results of the consultation with the critical number n=54, 0.05 significance level of 0.273. Point statement count reaches 0.273 declared invalid value and a value below 0.273 is declared invalid.

RESULTS

The results obtained based on the data for student achievement in sport science faculty, obtained the lowest value of 2.46 and the highest value of 3.85 with a range value of 1.39, the results of the analysis of data obtained from an average of 3.17, standard deviations 0.31and variance 0.10. The results of the frequency distribution of the data variable student achievement in sport science faculty Manado State University can be seen as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>class interval</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absolute</td>
<td>Relative (%)</td>
</tr>
<tr>
<td>1</td>
<td>2.46 – 2.56</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>2.66 – 2.85</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>2.86 – 3.05</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>3.06 – 3.25</td>
<td>16</td>
</tr>
</tbody>
</table>
Data management in faculty of sport science Manado State University obtained through a questionnaire shows the range of values/scores between 105 to 151 empirically the theoretical score range 31-155. The calculations show an average of 132.9; standard deviation of 10.26; and variance of 105.36 with interval class 7 and class length frequency distributions obtained as follows.

<table>
<thead>
<tr>
<th>No</th>
<th>class interval</th>
<th>Absolute</th>
<th>Frequency Absolute</th>
<th>Relative (%)</th>
<th>cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>105-111</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>112-118</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>119-125</td>
<td>5</td>
<td>10</td>
<td>18</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>126-132</td>
<td>16</td>
<td>32</td>
<td>50</td>
<td>78</td>
</tr>
<tr>
<td>5</td>
<td>133-139</td>
<td>14</td>
<td>28</td>
<td>78</td>
<td>100</td>
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<tr>
<td>6</td>
<td>140-146</td>
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<td>12</td>
<td>90</td>
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</tr>
<tr>
<td>7</td>
<td>147-153</td>
<td>5</td>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td></td>
<td>100</td>
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</tbody>
</table>

Once the structural model analysis carried out, the results obtained were used to propose hypotheses and measure how much direct influence on variable. The hypothesis has been put forward conclusions drawn through the path coefficients and significance test for management courses. The calculations show that the coefficient of management courses on learning achievement (p41) =0.329 \( t_{\text{count}}=3.609 \). Because \( t=3.609 \) and \( t_{\text{table}}=2.403 \) at \( \alpha=0.01 \), then \( t_{\text{count}}>t_{\text{table}} \), 3.609>2.403, then \( H_0 \) is rejected, which means that there is a direct positive influence management courses to the student achievement.

**CONCLUSIONS AND RECOMMENDATIONS**
The results obtained with the variable management courses can be concluded that there are significant positive direct management courses to student learning achievement in sport science faculty Manado State University. It means that the student's understanding of the course management system is well ordered, to give effect to an increase in student achievement. Suggestions in this study is in order to increase student achievement, the better the program of study must run management courses are organized both in the lecture.

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The Effet of Swimming for Control Salmonella typhi to the Intestinal Epithel of Wistar Mice

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Abstract:

There has been research that regularly physical exercise can increase SIgA. SIgA is defense of bowel system to microorganism by control adhesion and replication, pathogen microorganism colony like Salmonella typhi. This research examined the influence of physical exercise to Salmonella typhi adhesion to intestinal epithel. This research used female wistar mice, given treatment of regular and irregular exercise. Then the adhesion of germ on intestinal epithel that applied with Salmonella typhi so the growth of the germs of BSA medium can be detected and SIgA by immunohistochemistry.

The result on BSA medium is the most develop of germ to lack of physical exercise and the least to regular exercise. Between no exercise and no regular exercise no significant difference (p=0.429) The result from is physical training regularly is the best choice for control adhesion Salmonella typhi on intestinal epithel.

KEYWORD: The physical training, adhesion, SIgA.
INTRODUCTION

Swimming is one of the few ways of getting exercise that improve all fitness because it can increase strength, stamina and suppleness all at the same time. Swimming uses all the major muscle groups, and is a demanding of aerobic exercise that can improve the health of the lungs and heart. There has been research about the relationship between physical exercise and the incidence of infectious diseases. (Nieman, 1999). Moderate exercise has been associated with increased resistance to infectious diseases while excessive exercise, exercise combined with the stress of competition, or exercise during sick will lead to decreased resistance to infection. (Nieman, 1999) It has been suggested that regular moderate exercise, perhaps by causing regular release of small quantities of immunoregulatory cytokines, which initiate the immune system to more favorably of infectious challenge. (Conn C A, 1996; Pedersen, 1991). The immune system is strongly influenced by muscular exercise, both cellular and humoral immune system.

Several studies said that moderate physical exercise will increases Natural Killer cells, the number of neutrophils, basophils, the number and function of macrophages, cytokines, and T and B lymphocytes, including here immunoglobulin A, G and M. (Shepard, 2000, Pedersen, 1991) The increase of the number or function of the immune system due to the effect of stress hormone, or glutamine which the source of energy for both lymphocytes and monocytes, hormone and glutamine release is influenced by muscle contraction. (Pedersen, 1991). Therefore, typhoid fever, an acute infectious disease caused by the bacterium Salmonella enterica serovar typhi (S.typhi) (Mastroeni et al, 2003, Parry, 2002) is an infectious tropical disease which endemic and still a public health problem in developing countries in the world, including Indonesia. (Sudarsono R, 1996) Then physical exercise can be an excellent preventative choice to prevent infectious diseases like typhoid fever. Salmonella spp can do adhesion and colonization on various types of cells e.g. cell from gut, kidney and macrophag.

Bacteria have the ability to attach to host cells with a molecule that possesses both adhesin pili as well as in other parts of the bacteria. (L Murray P. et al, 1999, Hewartd H, 2003). Therefore the bacteria can bind to host cells, among other intestinal epithelium. (Giannasca et al, 1996). The process of adhesion is one of the virulence properties of pathogenic bacteria that are important for colonization, invasion, until the emergence of an infectious disease. (Doig et al, 1992, Giannasca et al, 1996, Herwald H, 2003). The infection in the gastrointestinal by Salmonella typhi bacteria, defense against microbes carried by the mainly IgA antibodies produced in mucosal lymphoid tissues and secreted by the mucosal epithelium into...
the lumen of the bowel. (Abbas et al, 2000) Secretory IgA (S Ig A) is the major immunoglobulin secretion in mucosal tissue. S IgA is found in saliva, intestinal secretions, bronchial lavage fluid, urine, tears and other mucosal fluids. S IgA can inhibit the adhesion of pathogenic microorganisms and replication, preventing colonization, and also neutralize toxins and viruses. (Lt Mackinnon, 1994, Akimoto, 2003). Beside physical exercise, prevention of infection is by vaccination. The 8 week of regular moderate physical exercise is enough to increase the production of secondary antibody (Kapasi, 2003). From the description above, it can be presumed that physical exercise, can increase secretion of IgA in intestinal epithelial cells, that would inhibit the adhesion Salmonella typhi bacterium on epithelial intestinal. Thus, purpose of this study is establish whether physical exercise that can improve adhesion prevents between intestinal epithelial cells by Salmonella typhi bacteria to preventing infection by Salmonella typhi.

**METHOD**

Type of research was laboratory experimental research. This study took approximately 6 months. Animals model in this study were Wistar rats Rattus norvegicus, twenty seven mice were divided into 3 groups, of 9 mice, one group the lack of exercise, one group irregular exercise, and one group regular exercise.

Propagation of Salmonella typhi bacteria M223.

Bacterial isolates were propagated on MacConkey medium and then incubated at 37 °C for 18-24 hours. Cultures from MacConkey medium is transferred into the medium bisphasik consisting of over BHI liquid medium and agar slant TCG. Cultures were incubated at 37 °C for 24 hours (Ehara et al, 1986).

Physical exercise experimental animals.
The physical exercise is divided into 2 groups. Each group have 9 experimental animals, regular exercise group performed the exercise 5 days a week with a break on days 3 and 7, the practice gradually increased from 15 minutes per day to 2 hours per day over a period of 8 weeks and no regular exercise group, irregular intervals exercise a week and with exercise long irregular anyway but a maximum of 2 hours for a day. Furthermore, within 24-36 hours after the last training day (end of week 8) surgery rats to take his intestines and adhesion inhibition test and calculation of IgA.

Examination of Salmonella typhi adhesion prevents test on the intestinal epithelium. To determine whether there is adhesion in vivo, planting (culture) of the
small intestine of mice 0.1 ml of each treatment on selective media Bismuth Sulfite Agar (BSA), with a 10-3 dilution. Colonies that grew after cultured at 37 °C for 24-36 hours, observed characterization, matched with control cultures of Salmonella typhi in the BSA. Furthermore colonies were counted by colony counter, so we get the number of the colonies were reported in 1 cc of intestinal homogenates. To obtain the bacteria Salmonella typhi that adhesion on the intestinal epithelium were done according to the test method for adhesion inhibitory(Sumarno 2000): Salmonella typhi bacteria taken scratches then put into 10 cc of a solution of lactose broth at 37 °C. Then liquid germ was centrifuged at 6000 rpm for 10 min at 4 °C and the sediment was suspended with PBS containing Bismuth Sulfite Agar (BSA) 1 %, the bacterial content was made about 10 / m. Suspensi 100 ul bacteria as bacteria are taken and inserted into the intestine (bowel which cut starting ileum to caecum), included in subsequent bowel shaking incubator, shake 60x/mt, for 30 min at 37 °C and then washed with sterile PBS (calcium-free). Bonding and done scraping the intestine opened. Scrapings collected then planted mediated Bismuth Sulfite Agar (BSA), incubated for 24 hours at 37 °C. Colonies that grew were identified and which have characteristics of Salmonella typhi is calculated by calculating the colony (colony counter).

Examination of Ig A staining method with techniques immunocytokimia Labeled avidin / avidin biotin complex.

Data analysis: The data obtained were analyzed using different test Two Way ANOVA with randomized block design to determine the presence / absence of differences between groups of physical exercise, followed by Tukey's test of multiple comparisons to determine whether there is a difference between each type of exercise.

RESULTS and DISCUSSION

From the calculation of the colony counters in the studied sample obtained the highest results on samples of mice without exercise (1328.650) in 1 cc of intestinal homogenates, and samples of the mice with the lowest is regular exercise (398.53) in 1 cc of intestinal homogenates.

The results of the growth of bacterial colonies on the medium Satmonella typhi Bismuth Sulfite Agar (BSA) derived from rat intestinal homogenates after treatment, there appears to be significant differences between the treatment lack of exercise and regular exercise (p = 0.032). Means there's a difference between the inhibition of adhesion molecule bacteria on the intestinal epithelium in lack of exercise and regular exercise.
There is a significant difference (p=0.049) between the regular and irregular exercise. While between the irregular exercise and no exercise no significant difference (p = 0.069). Which the no regular in frequency, intensity, duration of exercise and the type of activity that is mean no regular exercise as same as no exercise. For the calculation of the amount of S IgA with immunohistochemical staining on intestinal preparations that had been treated mice showed the highest production S IgA was in regular exercise (74.9; 116.1; 228.4) and at least on a sample lack of exercise (38.8; 96.1; 157.9). The results of the calculation of the average number of S IgA in 1 field intestine slices of view of painting with immunohistochemical methods showed that the no exercise and regular exercise, there is a significant difference (p = 0.033), as same as in no regular exercise and regular exercise, there is a significant difference (p = 0.012). Means that regular exercise can increase the amount of immunoglobulins, in this study is the S IgA in a substantial number compared to no exercise or no regular exercise. Medium between no exercise with irregular exercise did not different significantly (p = 0.429).

Physical exercise or sports are some of the activities that involve the whole muscle power to move actively (Knuttgen, 1983).

There are many types of physical exercise for example running, gymnastics, soccer, swimming and others. In this study selected swimming because it uses Wistar rats, that mice have a natural swimming ability and they assumed to highly motivated to avoid drowning when fatigue is imminent. They don’t have the option to float or jump, just swim for that platform and get onto it. Therefore the form of physical exercise is recommended for swimming rats (RJ Morris, 1998; Keitaro et al., 1996). Whereas in humans it is known that swimming is a physical exercise that uses almost every muscle in the body, from arms, hands, shoulders, abdomen, back, and legs, therefore swimming is exercise that move all the muscles of the body with a heavy load (Jensen, 1997).

There are many forms of physical exercise and its intensity, but broadly divided into regular and no regular exercise, in which of the order is based on four things: frequency, intensity, duration and mode of activity. The recommended frequency is 3-5 days per week, with a duration of 15-120 minutes, with a model of physical exercise that uses most of the muscle groups (Robert, 1990; Edwards, 1984). And the rest time of which there are certain rules, where the break is longer than provisions will not result in such exercises, or beginning of the exercise (William, 1986). Therefore in this study, the frequency of exercise is swimming 5 day for a week with a rest period in 4th day and 7th day, with a long physical exercise from 15 minutes to 2 hours done gradually. The results of the growth of bacterial colonies on
the medium Samonella typhi Bismuth Sulfite Agar ( BSA ) derived from mouse intestinal homogenates after treatment appears have a significant difference between no exercise and regular exercise, and between regular and irregular exercise. It means there is a difference between the inhibition of the adhesion of bacteria to the intestinal epithelium in regular exercise and no exercise. Therefore has been stated Pedersen, that the immune system is highly influenced by muscular exercise. The conjunction with the immune response, immune response is enhanced during moderate and severe exercise, but suppressed only after exercise of high intensity and long duration. However, in those who perform regular moderate exercise the immune system is often temporarily enhanced and it will protect it from infections. (Pedersen, 1999). So are the regular and irregular exercise there is a significant difference. It has been widely observed that the irregular exercise including weight training here actually adversely affect the immune system. (Pedersen, 2000; Nieman, 2000; Shepard RJ, 1999; Mc Ardle et al, 1986; AP.1990 Robert EL Fox, 1984)

Relationship of physical exercise and the immune system to the body's defense against infection has been studied mainly related to defense against virus.

Some exercise physiologists find a J shaped postulates that shows the relationship between physical activity and susceptibility to viral infection, which postulates a picture graph shows that people who do not exercise or just a little will have a susceptibility to viral infection, the susceptibility decreases with the higher intensity at the level of moderate exercise, but at a certain point with increasing severity level of the sport's susceptibility to viral infections is increasing as well as, such as the picture of the letter " J ". (RJ Shepard, MD, 1999). According to this hypothesis, regular moderate physical activity enhanced immune responses, reducing susceptibility to the common cold and cancer due to changes in the immune system of specific and non-specific. (RJ Shephard, 1999). In this study proved that physical exercise not only increases resistance to viral infection but also to bacterial infections, particularly Salmonella typhi. While the irregular exercise and no exercise was not significant different. Which means with no regularly exercise, from frequency, intensity, duration of exercise and the type of activity that as ame as not exercise. (Fox, 1984; Mc Ardle, B 1986).

The results of the calculation of the average number of S IgA in a field intestine slices of view of painting with immunohistochemical methods showed that between the not exercise and the regular exercise there is a significant difference, as well as in regular exercise and not exercise that a significant difference. It means that regular physical exercise can increase the amount of immunoglobulins, in this study is the S IgA in a substantial number compared to no exercise or irregular exercise. This is
because with regular physical exercise will increase the number of S IgA through stimulation of the Central Nervas System (CNS) which in turn stimulates the sympathetic nerves that cause an increase in the hormones adrenaline and noradrenallin thereby reducing neutrophil adhesion to the endothelium, leukocytes release of lien increases which causes an increase in neutrophils and lymphocytes in circulation. Lymphocyte activation by B cell growth factor (BCGF) and B cell Differentiation factor (BCDF) turned into B cells that subsequently differentiate into plasma cells, subsequently forming immunoglobulin (Glesson, 2002). In addition to bring the energy needs of muscle requires enzymatis and even have the capacity to synthesize a material that is glutamine, in addition to other energy sources.

Interesting that glutamine is not only a source of energy for muscle but also for lymphocytes and monocytes. Muscles have the enzymatic capacity to synthesize glutamine and it is known to release glutamine into the bloodstream at a high rate. Therefore muscle plays a vital role in maintenance of the rate of the key process of glutamine utilization in the immune cells, consequently, the skeletal muscles can be considered as part of the system. In moderate regular exercise as done in this experiment in regular exercise group, glutamine requirement will be fulfilled separately for the provision of energy for lymphocytes. The result, these will be higher S IgA in regular exercise than both no regular exercise and no exercise, because glutamine is produced is not maximal, and in the no regular exercise including heavy exercise, there will be need for much glutamine supply in the muscle, so it does not supply sufficient for immune cells. (Pedersen, 1999) It can be understood when people who have never exercise and not regular exercise more susceptible on infection. Then other studies that have been conducted both in animals and in humans showed that regular physical exercise and not a heavy exercise, the S1gA levels were increased after exercise. (Akimoto, 2003; Klentrou P, 2002, Nieman, 2002, Pedersen,1999).

**CONCLUSION**

Regular physical exercise is the best option to prevent the adhesion of Salmonella typhi in the intestinal epithelium.
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BUILDING A GOLDEN GENERATION THAT IS HUMANIST THROUGH PENCAK SILAT

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Abstract

Building a great generation or golden generation is not easy, especially with expanding tendencies in recent days such as the decline of norm value as an Eastern culture. Moreover, there are many violence and discriminations among young people. It is important to prepare golden generation by changing the mindset.

A golden generation can be formed through Pencak Silat. The building of golden generation through Pencak Silat is realized by implementing the noble philosophy. By having noble behaviors, people can fulfill their noble responsibilities as God’s creature, individual, social, and universal creature that are piety to their God, improving their life quality, putting the public interest above their own interests and loving the environment.

The humanist golden generation means a generation that has potentials whether in the thought, behavior, or attitude that concern with the humanist sides. The humanist sides are the involvement of brain and emotion in every activity. In Pencak Silat, the humanist attitude can be performed through mind, exercise, sensing, and feeling.

keywords: golden generation, pencak silat, humanist

Introduction

A great nation is born of a great generation anyway. The fate of the next nation is determined by the current generation. To form a great generation or so-called golden generation is certainly not easy, especially with the various trends that develop recently, such as the weakening of the noble values as a nation that respects Eastern Culture. In addition, violence and discrimination are still rampant among young people today. To prepare for the golden generation, it is important to change the mindset. The life that is growing and even more complex is a challenge to prepare the future of golden generation. Based on the phenomena, it is required sensitivity,
challenges and opportunities in response to changes that must be considered and addressed in a positive way by the younger generation.

To create a golden generation can be done from various sectors, including through martial arts. Pencak Silat is an Indonesian original cultural heritage that has local knowledge as well as a shield against the negative penetration of foreign culture. Pencak Silat is not just a martial art. It is filled with rules that fit the life sciences and can be applied in personal life, business, management, and leadership. The purpose of learning Pencak Silat is not to fight or look for an opponent but to worship, establish a relationship, maintain, and preserve the health, maintain the culture. In Pencak Silat itself, there are four basic aspects that are taught, among others; exercise, martial arts, art, and spirituality. Once the rules in Pencak Silat martial art are applied by today's young generation, the expected golden generation can be realized.

**Discussion**

1. Golden Generation

Preparing generation that is able to compete and quality is one of the duties of all components. Each generation has its own potential, that potential is inborn, but there are also a result of the educational process. If a generation is not educated properly, then its potential will not grow and develop optimally. The future generation is determined by today's young generation, so that the young generation is now the golden generation, the older generation must prepare as well, such as by education. It is expressed by Ki Hajar Dewantara (Bastian, 202: 111), to educate is to lead all the power of nature that exists in children in order for them as human beings and as members of society who can achieve highest safety and happiness. A golden generation is the generation that has the character of national identity that can be an overall pillar, integrity, and dignity of a nation.
Indonesian national identity is a religious culture, honest, polite, friendly, discipline and mutual assistance (M Arif Arifudin, 2012: 7).

A tough generation means youth who can use their youth to the things that are useful; obey the God’s commands and stay away from religious restrictions; can prepare themselves to live independently for the survival of life in the future; able to keep their family and their honour, and society in general; in everyday life, always consider the principle of benefit and negative effect; and unselfish. In other words, the golden generation that must be prepared is a generation that has 1) spiritual life, which is a God-fearing personality, polite and friendly, 2) has a high intellectual capacity that is able to be competitive with others especially with other nations. 3) young people who think visionary or want to think far into the future direction, they are able to become a pioneer for other youths to move, and 4) youth people who have strong character, young people who have a personality that is not easy to complain, not easy give up and never be a burden to others.

2. The Philosophy of Pencak silat

The Pencak Silat martial art philosophy is called philosophy of noble character. This is because it contains the philosophy value of noble mind (Agung Nugroho 2008: 7). The philosophy of noble character views that the public “tata-tentrem karta-raharja” (the community that is safe – comfortable and makes healthy- happy) can be realized to optimum if all citizens have noble character. Moral is the dimension of the human dynamic psychology that has creativity, taste, and imagination elements. All three are dynamic forms of sense, taste and will. Character is a mind that is visible in the form of character. All should be noble, namely the ideal or commendable. In the essence, manner or morality is a
condition or trait that has become pervasive in the soul and personality to various acts arising spontaneously and easy manner without artificial and without the need for thought. If good and commendable behaviours arise in the view of religion rules and the mind, then it is called a noble character and vice versa (Asmaran, 2002: 2)

Noble character according to Haidar Putra Daulay (2004) is a conscious effort made in order to embed or internalize moral values into the attitudes and behavior of the students to have the attitude and behaviour of the nobility 
(berakhlakul karimah) in everyday life, both in interaction with God, with others and with nature/ environment. With a noble mind and character, people will be able to meet the obligations of God's being virtuous, being personal, social creatures, and creatures of the universe that is being piety to the God, improving their self, putting the public interest above their own interests and love the environment.

Agus Mukholid (2004: 126) describes the noble values of Pencak Silat; that is 1) to practice and implement the martial arts as Indonesian culture which reflects the noble values, 2) improve the performance, 3) uphold solidarity, 4) the value of never surrender. Further, O'ong Maryono (1999: 79) argues that the practice contained in the philosophy of Pencak Silat martial art noble character is controlling in the sense of 1) a sense commitment to the norms, values and religious ideals and moral society. 2) responsiveness and the wise to any signs of developments, demands, and challenges, 3) firm and can develop the ability to face and overcome every challenge, 4) discipline and resilient in struggling temptation and trials, 5) dynamic and creative attitudes in order to achieve success and progress.
Philosophy of noble character is closely related to the formation of the character of a fighter, because it gives a foundation in the formation of attitudes and behaviors in an effort to achieve discipline and cultivation of good ethics. The great value of Pencak Silat is the basis for high ethical human form to improve the relationship with God, others and the natural surroundings.

3. The Concept of Humanist Pencak Silat

The Development of a humanist golden generation through Pencak Silat martial art can be implemented through physical and spiritual formation. A humanist golden generation means some generation that has good potential in thinking, attitude or behaviour that concern with the human aspects. The humanity side is the involvement of brain and emotion in every activity. Humanist can be interpreted as an orientation that emphasizes on the unique human qualities, especially that relate to free will and the potential to develop itself.

Pencak Silat as a martial art has great benefit in the self and personal formation. Self sees from the physical form, which means a healthy physical condition, whereas personality personal is seen from appearance, attitude of mind which tends to be called the mental and moral attitude (Muhammad Fajar Sidik, 2012: 4). According Notosoejitno (1997: 54) Pencak Silat in substance has four aspects: mental-spiritual, martial, art, and sport. To realize the golden generation, the four aspects of this unity cannot be separated. This is consistent with the concept of the character education process to think, exercise, sensing, and feeling (the Ministry of Education and Culture, 2010).
Notosoejitno (1997: 59), says that Pencak Silat is categorized into several branches, namely: (a) Pencak Silat as an art which is the whole branch of martial arts techniques and tricks in which a modification of the technique of self-defense and martial arts moves in accordance with the rules of aesthetics and intended use to show the beauty of martial arts; (b) Pencak Silat mental and spiritual is a whole branch of martial arts techniques and the tricks that is a modification of the technique and its use is intended to illustrate and also embed the teaching philosophy of martial arts; (c) Pencak Silat as a sport is that the whole techniques and tricks are used as modification of the techniques and movements of martial arts and its use is intended to establish and maintain physical fitness and agility and sports performance; (d) Pencak Silat martial art is a branch of the intended use of the overall techniques and the tricks is to maintain or defend themselves. Each aspect contains the values; self-control, self-defense tips, art movements, sport, and sportsmanship, which are all based on and colored by cultural values of society and imbued by the philosophy of noble character motivation.

The humanist concept of Pencak Silat should be able to realize its members, in this case the youth who will be the next generation that has properties of piety, responsive, resilient, tough, and aggressive and are qualified and have a personality that is to humanize humans. Atkinson et al (1998: 202) argues that personality is all forms of a pattern of thoughts, emotions and behaviors that are different and the characteristics that define the personal style of the individual and affect of the interaction with the environment. This is in line with the opinion of O'ong Maryono (1999: 7) who claims that the Pencak Silat is motions of martial art that is organized according to the system of attack, time,
place, and climate by always keeping the honour of their respective as a knight, do not want to hurt feelings, are very closely related with spiritual, so arouses instinct, triggers human conscience, resigns to God Almighty.

A golden generation should be 1) faithful and persistent in practicing the teachings of the God Almighty, 2) creative, intelligent, sensitive and careful in addressing the issues and be able to take advantage of the opportunity and responsibility, 3) tenacious, never surrender and be able to develop their ability to answer challenges in overcoming difficulties to uphold the truth, honesty and justice, 4) resilient in the face of temptation and trial, discipline and responsibility as well as comply with legal norms, social, and religious, and 5) nimble, agile, and dynamic skills, energetic, corrective, efficient, and effective for the pursuit of achievement. To implement that, there has to be self-control and able to determine its position. Self-control is a step that must be considered to achieve the education to be a complete human being. In order to realize the humanist Pencak Silat, it needs a basic relationship between human and God, human relationships with one another, and human relationship with the nature.

In Pencak Silat, humanist attitude can be done through humane attitude though thought, sports, sensing, and feeling. Thought is regarding to the reason for the process and to use knowledge critically, creatively, and innovatively. Sport is linked to the process of perception, readiness, imitation, manipulation, and the creation of new activities with sportsmanship. Sensing and Feeling are associated with the willingness and creativity that are reflected in the concern, imaging, and the creation. Feeling (by heart) is associated with feeling attitudes and beliefs / faith. (Indonesian Government, 2010: 21). Thinking in Pencak Silat can be realized in creating the whole basic movements into a coherent unity that
can be seen from the formation of the innovative and creative movements and attacks. Sports in Pencak Silat can be realized from the activity of physical movements such as punches, kicks, blocks, and defensive moves which implement ports and leisure achievement. The sense Pencak Silat martial art is manifested in not hurting each other, always greeting or respecting others when meeting them in activities with friends, opponents, or others. The feeling in Pencak Silat can be manifested by getting closer to God Almighty through prayer at the beginning and end of each activity.

Closing

1. Conclusion

Pencak silat has the role to realize the golden generation. It can be actualized in the characteristics of the fighter that is piety, responsive, tough, aggressive and has the humanist qualified personality. In Pencak Silat, humanist attitude can be implemented through mindset, exercise, sensing, and feeling. To perform those characteristics, it needs self control and has to be able to decide the attitude. Self control is a step that has to be considered to achieve the education that makes people humanist. In order to realize the humanist Pencak Silat, there has to be the fundamental relation between human that covers; the relation between human and God, human and human, and human and the universe.

2. Suggestion

To realize the golden generation, there are four things that need to do when training Pencak Silat:

a. The trainer should apply the relationship between human and God, human and human, and human with the universe.
b. Every move of Pencak Silat is performed with body, mind, heart, and sense so that the harmonic moves can be well performed.

c. To produce the golden generation, it is important to implement an early development.

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Pemerintah Republik Indonesia. 2010. Kebijakan Nasional Pembangunan Karakter
IMPROVING THE QUALITY OF LIFE THROUGH SPORT

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ABSTRACT

In the globalization and establishment period, the public tends to rule out a physical activity / exercise. It is so apparent when someone is passive in physical activity and more prominent in mental activity. Lack of movement can lead to decreased quality of life, to help improve the quality of life then it is necessary to improve physical fitness.

Physical fitness is so important when we talk about the quality of human life. This is because one measure of the quality of human life is physical fitness or physical. Physical implications of the fit to the quality of life is simple, with a fit physical activity of any kind will be resolved with optimal (maximum). If the physical fitness better, so capacity to learn / work will be better.

Physically fit also participated in the formation and cognitive development. Both have links to influence each other. As we know that the human brain is the center of all thought, the center of the coordinate system of the body. The brain is a central part of the body. If our brains are maintained in top shape, the coordination body will go well and when it was all supported physical condition fit it was complete it would make the quality of life increases.
Keywords: Improving the Quality of Life, Physical Fitness, Sports.

INTRODUCTION

Physical fitness becomes too apparent when we talk about the quality of human life. This is because one measure of the quality of human life is physical fitness or physical. Physical implications of the fit to the quality of life is simple, with a fit physical activity of any kind will be resolved with optimal (maximum) with the encouragement of physical fitness. If physical fitness means better capacity to learn / work also will be better (Karpovich, 1963).

Fitness is an important element in physical activity, sport, and exercise, fitness can also be referred to physical fitness. Physical fitness or freshness is a person's ability to do the job without incurring excessive fatigue and still have the energy reserves to do other work. Physical fitness is a necessity because everyone is a function of physical fitness and the ability to develop one's abilities, as well as useful to enhance their power (Djoko P, 2006)

Today in the era of globalization and establishment, the public tends to rule out physical activity. It is so visible to the people who live in urban environments. They are more likely to passive (in physical terms) and more prominent in mental activity, although it should not be so because in fact there is a correlation between physical and mental activity, the activity of the affected / influenced others (Webster, 1965). In urban communities, often arise various diseases or health problems caused by inactivity physical, it is commonly named as hypokinetik desease.

It has been proven if the abandonment of all forms of physical activity will bring adverse effects to health. The body that was never used, the situation will worsen. Occupational lung becomes inefficient; weakened heart; elasticity of blood vessels is reduced; muscle tension disappears and the whole body becomes weak, making it an easy target for
various diseases. The whole system is virtually wrinkle oxygen channeling entirely (Cooper, 1982).

According to The American Medical Association, there are seven factors that influence the development of one’s physical fitness, namely: (1) the health of individuals, (2) food, (3) maintenance of nutrition, (4) training, (5) satisfaction of work, (6) game healthy and recreation, (7) rest and relaxation / relaxation. (Moeljono, 1982).

Improved quality of life can be achieved if it is based on the old motto that is ingrained in every member of the sport, the men sana in corpore sano there are roughly means: In a healthy body there is a healthy soul. Indeed there is a strong connection between psychological aspects (mentally) the physical condition of a person. Both can’t be run separately, both are one unit. Excellent physical condition / fit if not supported by a good mental state also will have no effect in improving the quality of life. Vice versa, the mental condition of a prominent if not balanced with physical conditions that fit will be very useless. The fact that it looks now is precisely the application of both limping / unbalanced. There is a tendency that mental activity is more prevalent than physical activity. Here the role of physical education is so important to provide awareness of the importance of exercise in order to achieve a fit physical condition and result of balance between superior mental condition with excellent condition and physical fitness becomes a necessity to achieve a prosperous quality of life anyway.

Various studies have also shown that people who maintain appropriate body fitness, using wisely exercise (regular, scalable, and programmable), and perform weight management, has the additional advantage that a longer life. Particularly between the ages of 50-70 years, studies have shown that mortality tripled in people who are fitter than those who do not fit (Fatmah, 2011).
DISCUSSION

A. The nature (sense) Sports

   Exercise is physical movement performed for various purposes, such as health, fitness, recreation, education, and achievement. "Life is activity" (life is moving), meaning that the activity or motion is characteristic of life. Humans move in order to survive (survival). For example, early humans moved from one place to another and hunt animals in order to sustain life. Until modern times the activity or movement can’t escape from the demands of human life: to earn a living, to seek knowledge, to a degree of healthy and fit as well as develop skills through sports.

B. Problem exercising in modern times

   Shifting patterns of life from a lot of physical dynamic movement become rarely active is suspected as the cause of the decline in physical fitness levels. This is a negative impact of the rapid advancement of technology development. People vied to create a variety of fully automated equipment to replace almost all of human labor. The person who originally had to do physical movement, such as walking from home to work, to be replaced by the role of the motor or car so people tend to work less static physical or lazy (sedentary).

   The state of a person's lack of movement can cause degenerative diseases and non-infectious such as coronary heart disease, hypertension, atherosclerosis, diabetes mellitus, osteoporosis, back pain, easy fatigue, and so on. In order to avoid that all one must have an active lifestyle, including:

   1. Exercise regularly
   2. Enough Sleeping
   3. Eat regularly
   4. Weight Control
5. Free from cigarettes, drugs, and do not consume alcohol (Donna E Shalala, 1996)

The principle of active life

1. Do not lie, if it can sit
2. Do not sit, when to stand
3. Do not stand, if it can move

So it appears the motto "life is a struggle"

C. Why should I exercise?

Very often these questions were raised by people who rarely exercise, especially those that feel tired as the main complaint. How may need to exercise, when to perform daily activities had already incurred tremendous fatique ?. The human body is very adaptive, more use will grow. Exercise all the muscles that move the body and stimulates all the organs, will force the body to provide energy and make adjustments to the high workload.

D. Anyone who may exercise?

Everyone should exercise, whether it's society, students, athletes, and even being hospitalized may even exercise.

E. The nature (sense) physical fitness

On holidays, usually a lot of people doing sports activities such as jogging, running, walking, cycling, playing golf, badminton, and soccer field both open, the streets, parks and stadiums. Many also exercise at the fitness center, gymnasium, or sports associations such as heart healthy, gymnastics seniors and others.

Generally they do sporting activities as a group, although some are individual, of different ages, ranging from children, adolescents, mothers, fathers, until the elderly. What are they actually looking for? The answer varies, there is just part of it, leisure, social
trends, casual, and many more, but in general they crave fitness. Do feel fitter after the training?

Some terms are often used, among other things: freshness, fitness, kesemaptaan, and fitness. The term basically have the same sense, including physical fitness, mental fitness, emotional fitness, and social fitness or given term total fitness.

In general, mean fitness is physical fitness (physical fitness), that is the ability of a person to do daily work efficiently without incurring excessive fatigue that is still able to enjoy his free time.

F. According to (Djoko P, 2006), Fitness classified into 3 groups

1) Fitness Static: state of a person who is free of disease and disability or is healthy.

2) Dynamic Fitness: a person's ability to work efficiently that does not require special skills, such as walking, running, jumping, and pick-up.

3) Fitness motorist: a person's ability to work efficiently which requires specialized skills.

A runner is required to have running technique correctly to win the race. A football player is required to run fast while dribbling. A volleyball player should be able to jump while turning the body to perform a smash, and others.

<table>
<thead>
<tr>
<th>Static fit</th>
<th>Dynamic fit</th>
<th>Motor fit</th>
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<tbody>
<tr>
<td>Someone who felt healthy is not necessarily fit for to be able to do everyday tasks is not only required one free of disease, but also required to have a dynamic fitness. Athletes</td>
<td></td>
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</tbody>
</table>
are required motor fitness in order to perform optimally. Thus, there is a very close relationship between fitness and health.

G. Fit Tips

To obtain an adequate fitness required balance between eating, rest, and exercise.

Eat. To be able to maintain a decent living every human being needs to eat a good enough quality and quantity.

Take a rest. A person is not able to work continuously all day without stopping, for the rest required for recovery / restoration.

Exercising. Sport is one of the most effective and safe alternative to obtain because sports fitness has multiple benefits including improving fitness components (physical benefit), improve concentration and are more resistant to stress (psychological benefits), increase confidence and means to interact (social benefits).

H. Fitness Program consists of 3 basic movement (Molis), namely:

1) Move: continuous rhythmic motion, involving large muscles. This motion increases cardiorespiratory endurance and improve body composition
2) Lift: against the load, either B itself or external load. This exercise to train muscular strength and endurance, and toning muscle formation
3) Stretch: stretch the joints and muscles stalling. Train joint flexibility and muscle tone, so that mobility becomes high

I. Sequence fitness program

1) Warm up (heating): increase the body temperature and mobility, making it ready for weight training. Temperature rises 1-3 degrees, Intensity are 60% -70% DJM. (DJM: 220 - age)
2) Conditioning: individual, trained in all the components of fitness

3) Cool down (cooling): return early function, avoid muscle pain, joint and speeding recovery

4) Components FITT: frequency 3-5x weekly, DJM Intensity 70-85% (if less than 70% DJM less useful, people tend to be fat because increased appetite and if more than 85% DJM dangerous because people are often out of control), Time 20-60 minutes, Type: aerobic and anaerobic (expense)

J. The relationship between fitness and sports

1) The relationship between fitness and exercise are reciprocal and mutually beneficial (symbiotic mutualism).

2) Fitness can support the sports activities, while the sport can be a vehicle to maintain or improve fitness.

3) The positive effects

   - Immune system of people who often do sports to disease is greater than those who rarely exercise (immune bodies rose)

   - Pulse people who exercise less often than people who rarely exercise.

   - Physical quality of people who often do sports better than those who seldom exercise.

   Terms:

   - Performed and directed appropriately, taking into account the limitations of the body

   - Do regular, scalable, and programmed (70-85% DJM intensity, frequency 3-5x per-week, 20-60 minutes duration, type of continuous, rhythmic, involving large muscles.

4) The negative effects
If you do not comply with the rules:

- Women bony abnormalities / menstrual disorders
- Parents fat joint disorders

In addition to giving effect or influence on the physical (body) exercise also play a role in improving the health of the mind. Healthy think means being able to think and consider anything appropriately and accurately. Healthy think has an important role in improving the quality of life. Think health can be achieved through several ways, one of them through sports. There are 5 health benefits of exercise for the mind available in (http://www.forumkami.com/forum/fitness/53911):

1) Reduce the damaging effects of stress

Light exercise such as running or walking fast on a treadmill for 30 minutes also can be an instant way to release tension by increasing levels of a brain chemical that is "soothing" such as serotonin, dopamine, and norepinephrine. According to a study at the University of California, San Francisco, sports can work at the cellular level to reverse the adverse effects of stress on the aging process. The researchers found that women who make physical activity an average of 45 minutes for three days had fewer cells are experiencing the signs of aging compared to women with the same stress level but not active or do not exercise regularly. Exercise also helps convert blood flow to areas of the brain involved in stress relief.

2) Reduce Depression

Research shows that regular exercise and other physical activities that stimulate sweat for 3 times a week can reduce the symptoms of depression as effectively as antidepressant. That may be because the sport is believed to stimulate the growth of neurons in certain brain regions damaged during depression. Animal studies have also
found that increasing exercise will increase the production of brain molecules that can enhance the connections between nerve cells, thus acting as a natural antidepressant.

3) Improving the ability to learn something

Exercise will increase the growth factor in the brain that help make new brain cells and establish new connections between brain cells to help the learning process. Interestingly, complex activities, such as playing tennis or dance classes, provide the biggest brain boost. As with any muscle, you have to suppress your brain cells to make them grow. Complex activities also increase the capacity for learning by improving attention and concentration abilities. According to German researchers, high school students showed better results on the tasks that need high concentration after 10 minutes of fitness activity complex than the 10 minute routine.

4) Increase the confidence and sense of self-esteem

In this problem, one does not need to change the shape of the body becomes better in order to increase self-confidence. Studies show that just by looking at the increase in physical fitness, such as running faster or lift heavier weights than ever, will be able to boost your confidence and self-esteem.

5) Make perk mood

By doing exercise every day, then the condition of the body will feel more fresh and vibrant. There is nothing more joyful than having a fit body. Activity will be fun with the support of a fit and healthy body.

Apparentely it can be proved if the sports activities have a close correlation to the psychological condition of a person. It can be said if the sport is one of the factors that support the achievement of the health of the mind.
CONCLUSION

Physical fitness is very important in improving the quality of life due to fit any physical activity will be resolved properly. Physically fit also participated in the formation and cognitive development. Both have links to influence each other. As we know that the human brain is the center of all thought, the center of the coordinate system of the body. The brain is a central part of the body. If our brains are maintained in top shape, the coordination body will go well and when it's all backed a fit physical condition was complete then it will make your quality of life increases.
REFERENCES


Webster, Randolph W. 1965. Phylosophy of Physical Education. Iowa: MWCBrown Co Inc.
THE DIFFERENCE EFFECT OF LEARNING MODEL LIFE MODEL AND VIDEO MODEL ON INCREASED LEARNING RESULTS ON THE SWIMMING 50 METERS IN THE FRONT CRAWL STYLE JUDGING FROM MOTOR ABILITY

(Experimental Study on The Students Education and Sport Coaching of Teaching and Learning Faculty of Surakarta Tunas Pembangunan University)

By: Heri Pendidanto

ABSTRACT

The Difference Effect Of Learning Model Life Model And Video Model On Increased Learning Results On The Swimming 50 Meters In The Front Crawl Style Judging From Motor Ability (Experimental Study on The Students Education and Sport Coaching of Teaching and Learning Faculty of Surakarta Tunas Pembangunan University).

This research aims to find out: (1) the difference effect between of learning model life model and model video on increased learning results on the swimming 50 meters in the front crawl style, (2) the difference of increased learning results on the swimming 50 meters in the front crawl style between the students with high, medium and low motor ability, (3) the interaction effect between learning model with motor ability on increased learning results on the swimming 50 meters in the front crawl style.

This research employed an experimental method with 2 x 3 factorial design. The population of the research is the students Education and Sport Coaching of Teaching and Learning Faculty of Surakarta Tunas Pembangunan University. The sampling technique was purposive random sampling, the size of the samples taken are as much as 60 students. ANOVA was used to analyzing data, the data analysis prerequisite test was done using the sample normality test (Lilliefors test with $\alpha = 0.05\%$) and variance homogeneity test (Bartlett test with $\alpha = 0.05\%$).

Based on the result of the analysis, conclusions are drawn as follows: (1) there is a difference effect between of learning model life model and model video on increased learning results on the swimming 50 meters in the front crawl style. The effect of learning model life model is better than the model video, (2) there is a difference of increased learning results on the swimming 50 meters in the front crawl style between the students with high, medium and
low motor ability. The effect of increased learning results on the swimming 50 meters in the front crawl style between the students with high motor ability this better than the one with medium motor ability, the students with medium motor ability is better than the one with low motor ability, (3) there is a effect of interaction between learning model with motor ability on increased learning results on the swimming 50 meters in the front crawl style.

The students with high motor ability more suitable if it is life model. The students with medium motor ability more suitable if it is model video. While the students with low motor ability more suitable if it is life model.

Keywords: Learning Model Life Model, Learning Model Life Video, Motor Ability, Swimming.

A. Background of Problem

Swimming as the physical activity is one of a sport that developed in Indonesia. Many people performing sports swimming with multiple purposes, of them for recreation and entertainment keeping fitness and health until for the purpose of sports achievement. As sports achievement, including a sport that requires swimming movement explosively.

Training sports swimming, has not been able to do innovation and diffusion learning model. Innovation learning model can be done through two approach. First with do diffusion of new inventions research scientific and second apply learning model agencies, compatible with the growing utilization of the field of science and technology.

Constraints causing the delay coaching sports of swimming is a lack of coach apply science sport the increasingly complex. In sports swimming, a swimmer prosecuted always move while played some techniques elementary swimming. This means, to hold 50 meters style fronts crawl swimming well needed mastery a good technical and quality
of physical adequate because increase expertise swimming will only work if swimmer train physical regular and repeatedly.

The sport of swimming is a sport that requires the skills of each individual which inside contained some element of physical conditions that should be required in the race swimming such as strength, endurance, coordination, balance, explosive, and others. Mochamad sajoto (1995: 10) “component of the physical condition of includes: strength, speed, endurance, muscular explosive power, agility, balance, flexibility, and coordination. All of the components of the physical condition must be developed to support achievement students.

Achievement sports not separated from element physical condition. Increase the physical condition of athletes aimed to make physical performance be excellent and useful activity sports support in order to achieve a excellent performance (Suharno HP., 1993: 38). Physical exercise any sport is the foundation of coaching techniques, tactics and attitudes of college students. To get a high achievement, should be supported with physical conditions such as agility, speed, power, coordination, endurance, reaction time, flexibility, power that is urgently needed by the student in the sport of swimming 50 meters of front crawl style.

In understanding the problem a coach need to equip themselves with the science which enough. The coaching swimming now not only affected by coach and his students, but also by science especially science sport. In general many students even coach areas that believe that more do physical exercise means better. Actually determine the success an athlete instead of how heavily or how much athletes was practicing, but the bottom line is the accuracy intensity exercise (Janssen, 1987: 155).

Increasing results learn swimming 50 meters style fronts crawl optimally, it takes its form exercise according to the condition of the students. Learning proper to provide
exercise, begins with exercise about skills base so as to achieve performance of skill basic right. Student is a fine students, who have skill basic good. Weakness most prominent in swimming is the body, of foot movements, movements of the arms and breathing. With the presence of these weaknesses, a student Education and Sport Coaching of Teaching and Learning Faculty of Surakarta Tunas Pembangunan University trying first settled themselves in mastery of basic techniques in swimming 50 meters of front crawl style with good and true. During this learning model used is still not up to increase the ability of students in the mastery of techniques swimming 50 meters of front crawl style, often students just trained to do without purpose. Innovation and creation of swimming coach is indispensable, especially in determining and selecting the right learning model in accordance with the characteristics and essence of the material to be drilled. The selection of the study should also consider the availability of facilities and tools needed. The fact that this occurred when coaches are faced with time limitations as well as the inadequacy of tools that do not correspond to the number of students who will be trained while a lot of the material that will be trained to students. The problem is certainly one of the limitations of the ability and quality due to coach swimming in managing and modifying learning model. Improved learning results swimming 50 metres front crawl style optimally, it takes the form of exercise in accordance with the conditions of the students.

Model of learning is one way to improve sports achievements. During this learning model used is still not up to increase the ability of students in the mastery of techniques swimming 50 meters of front crawl style, often students are only trained to perform with no purpose. Innovation and creation of swimming coach is indispensable, especially in determining and selecting the right learning model in accordance with the characteristics and essence of the material to be drilled. The selection of learning model should also consider the availability of facilities and tools needed. The need for an efficient learning
model in the exercise swimming 50 metres front crawl style grounded by several reasons: first, the efficiency will save you time, energy, or costs; Second, the efficient methods will allow the athletes to master a higher skill level (Rusli Lutan, 1988: 26).

The learning model is a way of learning material rendering is done systematically to encourage the achievement of a goal of teaching in a process to make people learn. The application of appropriate learning model in the process of exercise swimming 50 metres front crawl style will also provide opportunities for coach in making use of its facilities available maximally so that there is no reason for coach swimming because it seems that the process of exercise factors swimming and a lack of facilities available. As a coach should know and comprehend the sciences knowledge associated. According to Nossek (1982: 1) “a variety of science concerned with sports among others are physiology, exercise, sports biomechanics, pedagogy in the field of sports, sports sociology, sports psychology and sports health”. This is important because the knowledge can be referenced as a concept underlying the establishment of a physical exercise program is effective.

Type of the learning model that can be used to increased learning results on the swimming 50 meters in the front crawl style of them are learning model life model and models video. To model of learning to be applied could be designed, with good beforehand traced factors that affects skill elementary swimming technique. To be able to swimming 50 meters in the front crawl style with good and right, then required elements like the speed, flexibility, balance, accuracy, endurance, agility, coordination and explosive power a muscle that good.

The learning model life model is done with a demonstration given directly from the swimming movement of 50 metres front crawl style described by the position of the body, the movement of the legs, arms and breathing movements. While the learning model
video model made by way of a learning model that provided graphically through a
computer kinematics of the swimming movement of 50 metres front crawl style described
by the position of the body, the movement of the legs, arm movements and breathing.

Success in the sport of swimming is the student factor. The thing is with Rusli Lutan
(1988: 322) says that the factors that influence the learning of motion are: (1) internal
conditions; and (2) external condition. The conditions include internal factors in the
individual, or other attributes that distinguish one with athletes and other athletes. One
factor is the ability of internal physical condition. Physical abilities are associated with
motor ability that affect student performance both in the exercise movements as well as
skills in a race. Thus it can be said a good motor ability is a requirement in order for
maximum student achievement in increasing results learn swimming 50 meters style
fronts crawl. It is seen as interesting and movement pushes water rapidly, requiring good
motor ability elements. Pulling and pushing the water movement is the basic techniques
that must be mastered, because students with interesting movement and push the water
quickly, students got a driving force or a good mover on the side as the body balance
settings.

Based on the description above known that laerning model having a very important
role and effect on scholastic achievement a student. Programs laerning model to increase
physical condition like that not applied especially on the students Education and Sport
Coaching of Teaching and Learning Faculty of Surakarta Tunas Pembangunan
University. Hence, research is called “The Difference Effect Of Learning Model Life
Model And Video Model On Increased Learning Results On The Swimming 50 Meters In
The Front Crawl Style Judging From Motor Ability (Experimental Study on The Students
Education and Sport Coaching of Teaching and Learning Faculty of Surakarta Tunas
Pembangunan University)".
B. Problem Statement

Based on the problem background, the problems need to be formulated as follows:

1. Is there effect difference between of learning model life model and model video on increased learning results on the swimming 50 meters in the front crawl style?
2. Is there difference of increased learning results on the swimming 50 meters in the front crawl style between the students with high, medium and low motor ability?
3. Is there interaction effect between learning model with motor ability on increased learning results on the swimming 50 meters in the front crawl style?

C. Problem Discussion

1. Swimming Front Crawl Style

   The movement of front crawl style first conducted by australians named Crawl, movement is by means of twice movements of the arms and accompanied two-hit of foot movements. Then a swimming motion front crawl style develops in accordance with new discoveries in science. Swimming technique front crawl style as follows:

a. Body Position

   The position of the body that both to the front crawl style is a position to give a force of thrust maximum and reduce of the drag up to minimum (Hay, 1993: 430). To meet these requirements, the position of
the body face-down, head slightly below the surface of the water, the base is a little lower than the shoulders, and legs limp and straight back.

1) Body position technique
   a) The position of the body in front crawl style should be parallel and as flat as possible.
   b) The body should be rotating on the center line or on its rotation.
   c) Avoid the possibility of the occurrence of hand or foot movements that result in the body up and down or snaking.
   d) The attitude of the head normally and the view is rather straight forward.

2) The body position is a form of exercise
   Floating face-down exercise using the glide way with face-down position.

b. Exercise Movement Of The Foot

Swimming front crawl style leg function is as a stabilizer over and as a tool for making legs remain high in a streamlined, so that the prisoner be small. On an inquiry showed that at low speeds, leg kick in front crawl style according to Hay (1993: 47) help generate a boost but at high speeds do not provide extra leg kick thrust away.

1) Foot movement technique
   Movement of the foot in front crawl style swimming acts as a thrust or power mover and especially as a regulator of the body's balance. Foot movement exercises done in the shallow pool.

2) Form of exercise movements of the feet
a) The basic movement kicked off while sitting on the edge of the pool.

b) Kicking motion while gliding.

c) The basic movement kicking and breathing with a float.

c. Exercise Movements Of The Arms

The pull phase according to Hay (1993: 367) occurs from three parts namely the initial press, scull inward, and outward scull.

1) Arm movement technique

   Arm movements on the front crawl style was cast primarily as a driving force or movers in addition as the body's balance settings. Arm exercises done in the shallow pool.

2) Arm movement forms

   On exercise movements of the arms emphasized in the movement of pulling and pushing water quickly.

d. Breathing Exercises

   The taking of breath should be performed as effectively as possible, so that the obstacles that occur in a smaller advance. The taking of breath is done by turning her head to face to the right and to the left. At the time turned the head follow the longitudinal axis of the body. The taking of breath is carried on during the just-ended movement the right hand drive backward.

2. Learning Model

   According to M. Furqon Hidayatullah (2009: 161), so that learning can be fun for the learners, the teacher must be good at packing so that learners are
interested in the study, one of his efforts is a teacher has a varied learning model. Therefore a teacher should be able to choose the right learning models that can give you the opportunity of an effective learning process so that it can give you the chance of occurrence of the learning process that is effective and efficient. As it was said Nadisah (1992: 96) States that the learning models will where appropriate, if they are able to improve the effectiveness and efficiency.

### a. Learning Model Of Life Model

In determining the learning strategy, the coach can choose or apply for specific models or ways of delivering training materials and organizes learning activities so that learning process is going well and the goal is reached. According to Singer (1975: 43) “Specific learning situations, or the confronted with individual task demonstration (life model)”. Life model is equipment, the cue and the task faced by the subject. Information beyond in a particular situation, related or not related to duty, representing stimuli which an organism will likely present. The challenge in facilitating learn is to transform life model with a desirable manner and best results have been met. Each way, who use an auxiliary apparatus or without aid or directly owns advantages and disadvantages of each. An election model of learning of have to consider other factors such as: the availability of supporting facilities, human resources, complexity and the rate of difficulty the movements of which are being studied.

According to Singer (1975: 43), that “besides the importance of an alert settings on the life model to understand tasks, visual feedback serves to motivate, invigorate, and direct behavior”. In most of the tasks, one can see how he had done. On the other, visual feedback on hold or distorted. As with all
forms of feedback, direct and accurate back according to what you want. Tasks, visual cues when compared to verbal and kinaesthetic under system by holding or tapping, often found to be the most profitable for skill acquisition. Therefore, the motion tasks should contain visual information about the performance of refunds, as well as a clear and specific visual cues to process information.

b. Learning Model Of Video Model

The use of an auxiliary apparatus model video currently is very often done, especially in the field of education. According to Singer (1975: 437) that “use video in arrangement instructional are examples practical that good in which certain media may have amplification motivation, and property feedback”. These tools generally consists of a video recorder (video camcorder, handycam) video and broadcast tools consisting of projectors and monitors. The projector can be an LCD (Liquid Crystal Display), DLP (Digital Ught Processing), and a wide range of video player, while for monitors can be either a TV or a white screen. For the use of LCD and DLP tools are required for a computer or a laptop. Recording of video tools in the form of video clips or movies. Video tools old model that still uses film as an instrument of rekamnya roll will produce a video recording of the video tape movies, while the newer models usually use digital cameras will produce a video clip that can be directly stored in various types of hardware such as: hard drive, pendrive, flopydisk, compactdisk, and other storage media. This tool is now better known as digital media. According to Arief Sadiman (1986: 68-69) film or video as a medium has several advantages, among others:
1) It is a common learning denominator. Students who are intelligent and less intelligent will get something together and the film or video.

2) Is the media that is good to tell a process. Movements can be rotated repeated and can slowed for the purpose of clarify movement in detail.

3) Can display back past, and events that has lasted.

4) Can captivate the attention of students.

5) Can overcome our limitations the sense of vision because actual motion can be rotated with rapid and repeated slowed.

6) Can stimulate or motivate the student activities.

   According to Gerlach and Ely in Sugiyanto (1988: 91) more advantages owned by use video, among other:

1) In the form of a motion picture can be recorded as events in the occurrence and allow the event disclosed back.

2) With the techniques of speed settings in the recording of images, a process that is going very slow, long, and can barely observed the process, through the moving image can be seen clearly in a very short time.

   According to Singer (1975: 49) “demonstration conducted by experts on the film, the student directly aim according to what to expect”. Looking at it, ultimately is expected to help the student to produce performance-related mental motion. When the purpose is explained and defined, then venture to their achievement becomes more focused and effective. Motion pictures, loopfilms, imagine the task of representation, video footage, tachistoscopes, and other visual tools have been used in research with varying degrees of success. Accompaniment music for study and performance of the tasks and skills the student has also produced effects which can be summed up in the relaxation,
motivation, stimulation, the rhythm of development or other purposes specifically designed.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>The Level Of Motor Ability</th>
<th>Statistics</th>
<th>Pre-Test Results</th>
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3. Motor Ability

According to Sukintaka (2004: 78), motor ability is the quality of the motion of the individual in doing motion, both non-sports movement or motion in sports or the maturity of the appearance of motor skills. While Rusli Lutan (1988: 96), explained that the motor ability is the capacity of a person with regard to implementation and demonstration of a skill is relatively attached. The quality of motor ability of someone who can make in doing motion skills, therefore the motor ability can be seen as the cornerstone of the success of the future in doing a special motion skills. “Someone who has a motor ability is better than the other, suspected to be more successful in completing the task of a special motion skills” (Kirkendall, Gruber, and Jhonson, 1987: 213).

D. Result

1. Description of Data

Table 1. Description Data Test Increased Learning Results On The Swimming 50 Meters In The Front Crawl Style Each Group Based On The Use Of Learning Model and Motor Ability.

2. Normality tests

Table 2. Resume of The Population Normality a Frequency Distribution

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3. Homogeneity Test

Table 3. Resume of Homogeneity Variance The Population

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<td>6</td>
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<td>5.65</td>
<td>11.07</td>
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</tbody>
</table>

E. Conclusion

Based on the results of research and data analysis results obtained the conclusion that:

1. There is a difference effect between of learning model life model and model video on increased learning results on the swimming 50 meters in the front crawl style. The effect of learning model life model is better than the model video.

2. There is a difference of increased learning results on the swimming 50 meters in the front crawl style between the students with high motor ability, medium motor ability and low motor ability. The effect of increased learning results on the swimming 50 meters in the front crawl style between the students with high motor ability this better than the one with medium motor ability, the students with medium motor ability is better than the one with low motor ability before the given learning model.

3. There is a effect of interaction between learning model with motor ability on increased learning results on the swimming 50 meters in the front crawl style.
   a. The students with high motor ability more suitable if it is life model.
   b. The students with medium motor ability more suitable if it is model video.
   c. The students with low motor ability more suitable if it is life model.
REFERENCE


ABSTRACT

The objectives of this research were to obtain information the profiles of biomotorability at softball athletes of Indonesian gold program. This study was conducted at softball athletes of Indonesian gold program by using survey methods. Described in this research was the use of strength, speed, endurance, flexibility and balancing as a measure of athletes biomotor ability, both of male and female athletes. Measurement their biomotor ability were held at the Faculty of Sport Science of Jakarta State University.

The research findings the profiles of biomotorability at softball male athletes of Indonesian gold program 2014 are; good strength 57.9%, average strength 34.2%, less strength 7.9%; good speed 86.8%, average speed 5.3%, less speed 7.9%; good endurance 0%, average endurance 0%, less endurance 100%; good flexibility 42.1%, average flexibility 52.6%, less flexibility 5.3%; and good balancing 21%, average balancing 58%, less balancing 21% and the profiles of biomotor ability at softball female athletes of Indonesian gold program 2014 are good strength 51.4%, average strength 48.6%, less strength 0%; good speed 67.6%, average speed 18.9%, less speed 13.5%; good endurance 0%, average endurance 0%, less endurance 100%; good
flexibility 75,7%, average flexibility 24,3%, less flexibility 0% , and good balancing 51,4%, average balancing 35,1%, less balancing 13,5%.

Keywords; Biomotorability; strength, speed, endurance, flexibility, balancing and softball athletes

Introduction

Most sport activities can be classified as having a predominant biomotor ability. Every sporting activity has a dominant biomotor ability. However, contemporary research suggests that sporting activities can be affected by several of the biomotor abilities. This can be clearly seen by the fact that muscular strength appears to influence both running speed and endurance at softball playing. Leg strength and power appear to be significantly related to sprint speed, with the strongest and most powerful at softball athletes being able to run the fastest. In fact, softball athletes performance is dominated by combinations of strength, speed, endurance, flexibility and balancing.

Biomotor Ability

Biomotor ability are critical factors in determining success in a wide variety of sports. For example, muscular strength and power are generally acknowledged as being important in all team sports and sports that are dominated by speed, not exception softball team sport.
**Strength.**

Strength can be defined as the maximal force or torque (rotational force) a muscle or muscle group can generate. Strength is better defined as the ability of the neuromuscular system to produce force against an external resistance. Contemporary literature suggests that high levels of muscular strength are significantly related to sport performance. For example, muscular strength has been related to sprint performance at softball playing. Therefore, the appropriate application of resistance training can alter the neuromuscular system in a way that improves the athlete's capacity to produce force and improves sports performance.

The maximal strength that an athlete can exhibit depends on seven key concepts: (a) the number of motor units involved (recruitment), (b) the motor unit firing rate (rate coding), (c) the amount of motor unit synchronization, (d) the use of the stretch shortening cycle, (e) the degree of neuromuscular inhibition, (f) the muscle fiber type, and (g) the degree of muscle hypertrophy.

The terms strength is widely used to describe some important abilities that contribute to maximal human efforts in sport and other physical activities. Unfortunately, there is often little consistency in the way the terms are used. Though it is widely accepted that strength is the ability to exert force, there is considerable disagreement as to how strength should be measured. The weight that a person can lift is probably the oldest quantitative measure of strength. Technological developments have popularized the use of isometric strength testing and, more recently, isokinetic strength testing. The coach and athlete must understand how the development of strength can affect performance. The coach and athlete need to understand the principles associated with
resistance training to effectively use resistance training to enhance performance. Measurement muscle strength used grip, pull/push, leg and back.

**Speed** is movement distance per unit time and is typically quantified as the time taken to cover a fixed distance. Tests of speed are not usually conducted over distances greater than 200 m because longer distances reflect anaerobic or aerobic capacity more than absolute ability to move the body at maximal speed. Developing a plan for speed and agility training begins with the development of the annual training plan. The annual training plan will be structured based on the sport's characteristics.

Speed-endurance provides the metabolic conditioning needed to support the maintenance of running speed and agility over an extended period (6+ seconds) or to achieve maximum acceleration or speed during repetitive sprints. Relatively few athletic activities involve a single, brief effort. Many sports consist of ongoing submaximal activity with intense, intermittent bursts in effort. Even in brief, discrete activities, specific endurance qualities are necessary to achieve certain volume loads in training. It is therefore important to develop athletes' special endurance the ability to repeatedly perform maximal or near-maximal efforts in competition specific exercise: relief patterns (commonly called worfcrest ratios). This is a variation on the speed-endurance concept and requires two qualities: the metabolic power to execute specific techniques at the targeted effort level, and the metabolic capacity to do so repetitively.

**Endurance** can be classified several ways. For example, aerobic endurance, sometimes called low-intensity exercise endurance, allows a person to perform activities continually for a long duration, whereas anaerobic endurance, or high-intensity exercise endurance, provides the ability to repetitively perform bouts of
high-intensity exercise. Although most sports rely on some form of endurance, the type of endurance developed (high or low intensity) can significantly affect performance outcomes. Therefore, the coach and athlete must consider the type of endurance that the athlete needs for the sport and how the appropriate endurance will be targeted within the training plan. The coach and athlete must also consider the athlete's physiological responses to the methods for developing endurance. Once the type of endurance and the physiological responses are understood, the coach can develop a training plan to enhance sport-specific endurance.

The concept of endurance differs distinctly between various sporting activities and thus can be defined in several different ways. For example, the type of endurance that an marathon runner athletes needs provides the ability to continuously perform at a specific power output or velocity for a long duration of time. Conversely, an softball player needs to repetitively perform periods of high-velocity movements for several time with periods of recovery. Although some form of endurance affects both athletes' performance, the development of endurance in these athletes will be distinctly different. If the wrong type of endurance training is implemented, the athlete might develop endurance characteristics that do not meet the needs of the sport, and thus performance capacity can be reduced. To understand the correct application of endurance training, the coach and athlete must differentiate between the two major types of endurance reported in the contemporary literature: low-intensity exercise endurance (LIEE) and high-intensity exercise endurance (HIEE).

Activities that are predominated by aerobic energy supply tend to exhibit lower peak powers and thus can be classified as being of lower intensities. These activities require the athlete to perform continually, at a low intensity, for a substantial duration. Thus, this type of endurance is often termed LIEE or aerobic endurance.
Sports that rely on anaerobic metabolism usually require high power outputs or the repetitive performance of high-velocity movements. Because anaerobic activities require higher power outputs than those seen in aerobic activities, anaerobic activities can be classified as being of high intensity. Therefore, the ability to sustain and repeat high-intensity exercise bouts is considered to be HIEE. The development of HIEE does not impair strength and power-generating capacity, as typically occurs when LIEE is developed.

**Flexibility** can be defined as the range of motion about a body joint. Typical devices for measuring flexibility include manual and electric goniometers, which measure joint angle, and the sit-and-reach box, which is used to evaluate the combined flexibility of the lower back and hips. Flexibility measurements are more reliable when standardized warm-up and static stretching precede the flexibility assessment. During a flexibility test, the athlete should move slowly into the fully stretched position and hold this position. Ballistic stretching, characterized by bouncing to increase range of motion, should be prohibited during warm-up and cannot be allowed during any flexibility testing.

**Balancing** is the maintenance of a position without moving for a given period of time. Many lower body plyometric drills require the athlete to move in nontraditional patterns (e.g., double-leg zigzag hop and backward skip) or on a single leg (e.g., single-leg tuck jump and single-leg hop). These types of drills necessitate a solid, stable base of support upon which the athlete can safely and correctly perform the exercises. Three balance tests; each test position must be held for 30 seconds. For example, an athlete beginning plyometric training for the first time would be required to stand on one leg for 30 seconds without falling. An experienced athlete beginning an advanced plyometric training program must maintain a single-leg half squat for 30
seconds without falling. The surface on which the balance testing is performed must be the same as that used in the plyometric drills

**Softball**

Softball is a variant of baseball played with a larger ball on a smaller field. It was invented in 1887 in Chicago as an indoor game. It was at various times called indoor baseball, mush ball, playground, softbund ball, kitten ball, and, because it was also played by women, ladies' baseball. The name softball was given to the game in 1926. A tournament held in 1933 at the Chicago World's Fair spurred interest in the game. The Amateur Softball Association of America (founded 1933) governs the game in the United States and sponsors annual sectional and World Series championships. The World Baseball Softball Confederation (WBSC) regulates rules of play in more than 110 countries, including the United States and Canada; before the WBSC was formed in 2013, the International Softball Federation filled this role. Women's fast-pitch softball became a Summer Olympic sport in 1996, but it (and baseball) were dropped in 2005 from the 2012 games.

There are two types of softball. In the most common type, slow-pitch softball, the ball, sometimes larger than the standard 12 inches, must arch on its path to the batter; there are 10 players in a team; and bunting and stealing are prohibited. In fastpitch softball, the pitch is fast, there are nine players on the field at one time, and bunting and stealing are permitted. Softball rules vary somewhat from those of baseball. Two major differences are that the ball must be pitched underhand—from 46 ft. (14 m) for men or 43 ft, and 35 ft for 10u, 8u, and 6u girls. (12 m) for women as compared with 60.5 ft. (18.4 m) in baseball—and that seven innings instead of nine constitute a
regulation game. Despite the name, the ball used in softball is not very soft. It is about 12 in. (30.5 cm) in circumference.

The purpose of this paper is to present the physiological biomotor ability profile of softball. In addition, it will critique my initial theories about the importance of the energy systems to this sport as well as ASEP’s model. These critiques will be based on the findings of five peer-reviewed journal articles found using the SPORT Discus database. Due to the limited amount of resources and the absence of a softball specific model in the text, I will refer to also refer to baseball since it is similar to softball in many areas.

**Research Method**

The objectives of this research were to obtain information the Profiles of Biomotor Ability in Both Male and Female Softball Athletes of Indonesian Gold Program 2014. This study was using survey methods. Described in this research is the use of strength, speed, endurance, flexibility and balancing as a measure of athletes biomotor ability, both of male and female softball athletes. Measurement their bimotor ability held at the Faculty of Sport Science of Jakarta State University. The number of 38 male athletes and 37 female athletes as total sampling.

**Result**

Profiles of Biomotor Ability of Male Athletes

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<thead>
<tr>
<th>Muscle Strength</th>
<th>Number</th>
<th>Percentage</th>
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<td>3</td>
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</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100%</td>
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<td>Number</td>
<td>Percentage</td>
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<td>-------</td>
<td>--------</td>
<td>------------</td>
</tr>
<tr>
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</tr>
<tr>
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<td>3</td>
<td>7.9 %</td>
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<tr>
<td>Total</td>
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<td>100%</td>
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<table>
<thead>
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</tr>
<tr>
<td>Average</td>
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<td>0</td>
</tr>
<tr>
<td>Less</td>
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<td>100%</td>
</tr>
<tr>
<td>Total</td>
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<table>
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Profiles of Biomotor Ability of Female Athletes

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<tr>
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<td>Total</td>
<td>37</td>
<td>100%</td>
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<td>24.3%</td>
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<td>0%</td>
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<tr>
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<tr>
<td>Average</td>
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</tr>
<tr>
<td>Total</td>
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</table>

Discussion

Male athletes tend to show an average balance (58%), average flexibility (52.6%), bad endurance (100%), good speed (86.8%) and good muscle strength (51.9%), while female athletes tend to show pretty good balance (51.4%), good flexibility (75.7%), bad endurance (100%), good speed (86.8%), and good muscle strength (51.9%). Performance of both male and female athletes can be improved by using specific strategies based on this data.
References


http://www.tandfonline.com/doi/abs/10.1080/00140138108924881#preview
THE IMPLEMENTATION OF SPORT PHYSIOLOGY TO SUPPORT SPORTS ACHIEVEMENT

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Surabaya State University

Abstract: Sports achievements supported by various sciences that complement each other. One type of such knowledge is exercise physiology. Problems in the field of sports is not all of the practitioners have a background in education, either formal or non-formal, in the field of sports so that the implementation principles of exercise physiology is often overlooked. It therefore requires effort approach and delivery of content of exercise physiology through standpoint of sport practitioners about the implementation principles of exercise physiology in sport achievement so that in future the sport practitioners are able to apply the principles of exercise physiology correctly in the effort to achieve optimal performance.

Keywords: sport achievement, exercise physiology, sport practitioners.
Introduction

Sports achievement can not be done without science and technology. To achieve peak performance it is necessary to support a wide range of fields and multidisciplines of sciences are able to support it. In theory and methodology of training involved a variety of disciplines that mutually support and complement each other. The sciences include: (1) anatomy, (2) exercise physiology, (3) biomechanics, (4) statistical, (5) test and measurement, (6) sports health, (7) psychology, (8) motor learning, (9) sports pedagogy, (10) nutrition, (11) the history of the sport and also (12) sociology of sport (Bompa, 2006). In addition, the quality of training in sports achievement is strongly influenced by diverse factors also support each other and complement each other. These factors include: (1) athletes, (2) the knowledge and personality of the coach, (3) Facilities and infrastructure, (4) the climate of competition and sports science support the achievement (Bompa, 1999). If all these factors are optimal then surely significant effect on the performance and achievements of athletes.

Further discussion is specifically directed at the coach factor in sports achievement. It has been previously known that the knowledge of the coach is very influential on the quality of exercise in sport achievement. If the coach has a good knowledge of the various fields of science that support the quality of coaching methodology would be very positive exercise and optimal. But if the coach does not have a good knowledge of the sports training program that is raised often based on the experiences of the past. By looking at the example of one of the latest facts about the educational background of volleyball coach, it is known that of 20 trainers from eight volleyball teams in the city of Surabaya, it is known that only 25% of coaches who have a formal educational background in the field of sport, 95% coach is a practitioner in the field and a volleyball coach which is a combination of academics and practitioners by 25% (Yuliana, 2014). By looking at the above data, it turns out that there is a majority of the coaches sport practitioners who are not educated in the field of sports.

When it is associated with the science supporting the theory and methodology of coaching, especially in the field of exercise physiology, it is very likely that there are principles in the exercise physiology does not run optimally on the training
process of sporting achievements. Whereas previously known that without using the
science of sports training process will not achieve the high quality of training, this
will certainly have an impact on the performance and achievements of athletes who
cultivated. Therefore, a simple way to exercise physiology can be applied to sports
training process is to demonstrate the applicability of concise and simple exercise
physiology in sport achievement for the sport practitioners.

The Implementation of Cardiovascular System in Sports Performance

The term of cardiovascular comes from a combination of cardio and vascular
word. Cardio is another name for cardiac, vascular is the other terms of the blood
vessels. Cardiovascular system can be interpreted as the circulatory system with the
heart works as a pump to drain the blood to all parts of the body through blood
vessels. So there are three elements in the circulatory system of the heart, blood and
blood vessels.

At the implementation of the sports activities going on physiological responses
performed by the cardiovascular system. One of the responses that the heart is done
by increasing the heart rate. With the increase in heart rate, the amount of blood that is
distributed to more quickly accepted by the members of the body. It is important to
deliver oxygen and nutrients to the cells, bringing heat to be taken and released
through the skin's surface and release carbon dioxide as a result of metabolic waste.
While the response of blood vessels to do with the process of vasodilatation in active
muscle or dilate blood vessels so that the blood vessels widen the more the amount of
blood that can flow rapidly through the blood vessels.

The intensity of exercise is very closely related to the cardiovascular system.
The intensity of exercise can be defined as the degree of severity of mild or sporting
activities undertaken. The level of exercise intensity is directly proportional to the
cardiovascular system works. When low-intensity exercise, the heart will beat more
slowly, but at a higher intensity exercise, the heart will beat faster.
By looking at the picture above, it is known that different types of sports activities have high levels of exercise intensity are different. This has implications for the faster or slower of individual heartbeat. Furthermore, the range of exercise intensity then there is a specific purpose or the effect on the body.

Figure 1 Differences in pulse rate according to the type of exercise with different intensities (Harisenjaya, 1996)

Figure 2 The benefits of exercise at various intensities of exercise

(Source: www.healthyperformance.co.uk, 2013)

By looking at the picture above, it is known that each interval of exercise intensity has a different purpose and impact on the body. For example if you want to
burn fat in the body, the intensity of exercise should be done at intervals of 60-70% of the maximum pulse rate of individuals. Based on the above table can be categorized as mild intensity exercise. For example, if an athlete has a 20 year old so he has a maximum pulse rate of 200 beats per minute. Therefore, for optimal fat burning exercise pulse then he should keep is in the range of 120-140 beats per minute. If it turns out when the pulse train in the range of 160-180 beats then the effect of the exercise in an attempt to be not optimal fat burning, but rather affects the body's maximum capacity.

By looking at the above example, it is known that the knowledge of the intensity of exercise and the effect is very important to understand and implement by coaches, coaching staff and athletes who are practitioners of the sport. Because without the knowledge of good and best practice in training intensity and the effect the exercise program that is run very likely not achieve its objectives optimally. Therefore, implementation of a cardiovascular system that can scarcely be done by practitioners of the sport as a form of exercise physiology actual practice is to perform pulse measurements on a regular basis. Pulse measurement include pulse measurement of basal, resting, exercise and recovery. Basal pulse measurement is done at a time when athletes morning just woke up. Measurement of resting pulse rate is calculated when athletes in a relaxed position or sit without doing meaningful activities. Exercise pulse rate measured when athletes are doing sports activities, especially in the core phase. While the recovery pulse rate calculated when athletes finished doing core exercises.

Pulse measurement is done on a regular basis in order to determine the performance of the cardiovascular system updates on the athletes. Well-trained athlete will certainly have a very optimal cardiac performance. In general, it is characterized by low resting pulse rate and pulse rate recovery was easy back down below the 100 after doing heavy core exercises. To know the pulse update the practitioner should practice sports regularly pulse measurement regularly. While constrained by the cost of the measurement pulse can be either palpation or touching yourself. The simplest way is to calculate the pulse at the wrist or neck for six seconds. The results of these counts multiplied by ten. For example, counting the resting pulse rate of an athlete, after checking the six figures obtained as a result of the calculation. Then six
multiplied by ten is 60 Figures 60 beats per minute is counting the resting pulse rate value of the athlete. The advantages of this measurement is not needed at all costs, but its weakness is likely to occur when a pulse counting error athletes or other sports practitioners are less sensitive in detecting a pulse.

Figure 3 Measurement of pulse palpation in the neck or wrist (Source: www.philadelphia.phillies.mlb, 2013)

Another way that can be done by a health practitioner to measure the pulse rate is to use a pulse measuring device. Usually these tools shaped wristwatch equipped with a chest band, bracelet or pulse detection. Pulse measurement by this method is more practical for sports practitioners do not need to do a direct pulse measurement. Automatically pulse measurement results will appear on the monitor screen at or bracelet.
The advantages of this measurement tool is the result of rapid and accurate measurement. However, it takes a fairly expensive investment purchases. Pulse detector as shown above has been widely used as a test and measurement tool to know the updates of sports resting pulse rate, exercise and the recovery of an athlete.

**The Implementation of Environmental Heat In Sports Performance**

In the implementation of sports activities then there is a change in the physiological systems of the human body. These changes occur in the cardiovascular system is working, respiratory, muscular work and heat dissipation mechanism. Currently sporting activities implemented then changes the body's metabolism increases up to 20 times higher than normal activity. Examples of changes in the muscular system of the blood glucose uptake by skeletal muscles that are contracting can increase 30-40 times, from 0.1 mmol / min at rest to 3-4 mmol / min, depending on the intensity and duration of exercise (Katz et al 1986, 1977 in Giriwijoyo Wahren, 2007).

To support the needs of glucose uptake from the blood circulatory system to respond by increasing heart rate and cardiac output. At maximal exercise cardiac output increased from 5 liters / min to 20-25 liters / min (Giriwijoyo and Sidik, 2012). The response given by the respiratory system is to speed up the frequency of breath
due to an increased need for oxygen and release carbon dioxide. The need for increased oxygen consumption of 5.7 while sitting increased to 21 when the execution of the sport of tennis (Wiarto, 2013). Response of heat release is made by the body to heat flow through the blood vessels to be brought to the skin surface causing evaporation process. Heat release process to stabilize the body temperature is essential to reduce the risk of heat injury.

Indonesia country which is located in the equatorial region has a tropical climate. In the tropical climate is divided into two seasons, summer and rainy season. Having regard to the geographical condition of Indonesia, the state of our environment has a temperature and humidity levels are high. When linked with the sporting achievements of exercise performed in environments with temperatures and high humidity then susceptible to heat injury in athletes. According Giriwijoyo (2007) stated that the injuries were caused by a hot environment can be divided into four, namely:

**Heat cramps**

Heat cramps or heat seizure is an injury to the lightest level and a lot happens in a hot environment due to environmental temperature and humidity are high. Heat cramps often occur in large muscle groups such as the quadriceps and hamstring (Gatorade, 2014). It is characterized by a sense of rigid and difficult to be moved in large groups are active. In general, heat cramp caused by lack of salt is lost with the amount of sweat that is excreted by the body. In addition to its lack of salt, muscle spasms often occur as a result of low potassium levels in the body (Mirkin and Hoffman, 1984). A recent example that occurred in Brazil's 2014 World Cup match when Italy against England in the group stage which Italy won 2-1, that some English players have seizures heat in the second half. The air temperature is 380 centigrade and the humidity reaches 80% in Manaus, Brazil is causing heat injury prone players (JPNN, 2014). Heat cramps can be cured by resting athletes in the shade and give salt intake, either through food or drink.

**Fainting heat (Heat syncope)**

The level of injury is more severe than the faint heat cramp heat. Heat syncope is an event someone loses consciousness for a short while due to severe heat stress
environment. This occurs because of the accumulation of blood in the veins that cause disturbances in circulation (Giriwijoyo, 2007). Countermeasures fainting due to the heat environment with athletes lay on a cool room and cold, elevate his feet with a height higher than the position of the head and give it a drink when the athlete regained consciousness.

**Heat exhaustion**

Heat exhaustion is a heat injury rate that is higher than the hot fainted. At this stage it athletes physical disorders such as headaches, nausea, increased body temperature and pulse beat faster. Heat exhaustion if neglected it can be increased in the most severe stage, the severity of heat. To prevent the occurrence of hot gravity then the athlete needs to be given intravenous fluids and a cold compress on the entire body.

**Heat stroke**

Severity of heat is a continuation of events from heat exhaustion. Heat injury is a type of injury that is very dangerous because it can cause death in athletes. One example of athletes who died from heat stroke was Korey Stringer. American football athlete has died as a result of the core body temperature reaches 420 Celsius (Kusnanik, 2011).

There is a very wise Indonesian proverb "prevention is better than cure". This adage also applies very precise in terms of the risk of injury from a hot environment and sport activities. According to Gatorade (2014) mentioned that in addition to environmental factors, temperature and high humidity, the heat in sports injuries can be caused by factors other supporters of the lack of body fluids and the selection of materials that are not appropriate clothing.

Appropriate strategy in the relationship between exercise and the prevention of heat injury is needed to achieve optimal performance without compromising the health of athletes. Here below are tips that can be performed by practitioners of sports to reduce the risk of heat injury when sporting activities, namely: (1) Choose a fabric that is able to do with good air circulation, (2) Select a bright color clothes that tend to reflect heat, (3) Avoid the use of multi-layered clothing, (4) Avoid outdoor sports (outdoor) between 10.00 am to 15.00 pm, (5) Drinking without waiting thirsty during
exercise, (6) Make the process of acclimation or adjustment to the environment fairly new.

Developments in science and technology is running very fast. This brings a positive impact on the world of sports, especially in the sporting achievements. The athletes are required to continue to show the best sports performance despite being in areas with air temperature and humidity are high. This is a challenge for science and technology to address the above problems. Top sports equipment manufacturers such as Adidas (ClimaCool), Nike (dry fit) and (play cleaning) Reebok vying to develop sportswear that is "breathable" or doing good air circulation so that the heat generated in the area of clothing can be released into the atmosphere as a maximum and replaced with fresh new air.

The product appears in the form of T-shirts, hats, pants, socks and sneakers. In addition to the selection of materials that breathable, sports equipment manufacturers also choose the t-shirt design is not in vain. This is done by mapping the distribution of sweat in the human body (body mapping). With the body mapping and the use of quality materials right then it is able to reduce the amount of sweat released very athletes that help to maintain their performance.

Another example is the use of cooling gloves in the world of sports. The cooling glove has been proven to reduce body temperature and speed up the body's recovery phase. Research conducted Stanford university researchers if the United States indicate that the cooling gloves are able to work better than steroids (McClurre, 2012). In the implementation of the Brazil 2014 World Cup, the Italian team was able to be free from interference due to the use of cooling muscle spasms gloves. It is inversely proportional to the England team who reject the use of gloves by reason of cooling is not enough time to prove the benefits of these tools (Winter, 2014). The fact of the game is to win against England Italy 2-1 in the second half where several England players having muscle spasms due to a hot environment.
Technology to prevent dehydration in athletes has been well cultivated by the manufacturer Gatorade sports drinks. By working with the Brazilian men's soccer team at the World Cup 2014, Gatorade did research for two years to find a detection sensor technology how many athletes to drink fluids are connected through the Internet is connected to the computer program.

Figure 5 The use of cooling gloves at the wrist
(Source: www.gizmas.com, 2014)

Figure 6 and 7 Dehydration detection Bottles and software of dehydration detection for athletes and record the data on ipad (Source: www.4.bp.blogspot.com and 1.bp.blogspot.com)
With this technology, coaches and staff of the Brazilian team coach always know the condition of body fluid on his athletes, thereby reducing the risk of dehydration, which can degrade the performance of the sport. At temperatures and high humidity during the movement of the sport, the athlete will be a lot of sweat in an attempt to achieve homeostasis. With more and more sweat secreted by the body the more the lost body fluids. When more and more lost body fluids, the greater the risk of dehydration. If dehydration occurs, the athlete will experience a decrease in concentrations that affect sports performance in the field. Therefore, with the technology that is capable of detecting the risk of dehydration during exercise in environments with high temperatures and high humidity, the athlete sports performance can be maintained properly in order to achieve optimal performance.

The Implementation of Respiratory System in Sports Performance

The respiratory system is closely related to the exchange of oxygen and carbon dioxide gas. This process is important in order to introduce oxygen into the body that is used in the process of formation energy for life activities and release carbon dioxide into the atmosphere as the rest of the energy metabolism. In respiration or respiratory system, lung vital role in both the gas exchange process. The lungs are made up of approximately 600 million alveoli (Hutapea, 2002). Alveoli or alveoli are small pockets such as a wine bag exchange between oxygen and carbon dioxide.

In summary, the flow of oxygen traveling to the lungs can be explained by the picture below

![Diagram of the flow of oxygen to the alveoli](Source: Wiarto, 2012)

When compared with the normal activity at the time of execution of sports activity increased muscle contraction, energy needs, pulse and respiratory rate. It occurs as a physiological effort in these activities in order to run well. In severe sports
activities, an increase in the frequency and depth of breath can be increased up to two or three times higher than normal activity (Afriwardi, 2010). Furthermore, look at the picture below.

![Kebutuhan Oksigen pada Beragam Aktivitas](image)

**Figure 9 Oxygen Demand Levels in Various Activities**
(Source: Camerun, et al; 2006)

By looking at the picture above, it is known that the level of oxygen in the body's needs are very different, depending on the light level or severity of the event. At the time walking slowly increased oxygen demand of 12.7 is very high on the execution of the test up and down Harvard to 53.7.

In normal breathing, the oxygen and carbon dioxide going in and out through the nose. Breathing through the nose has its own advantages because when air enters the air passing through the nose it will undergo a process of filtering, cleaning, warming and humidification to conform with that of the air temperature in the body. Therefore, the process of breathing is done through the nose to have a high quality. It is very different happens when the breathing is done through the mouth, because the mouth is part of the respiratory system with the main function to digest food. If the oxygen uptake process is done through the mouth of the resulting air quality is very low because the mouth does not undergo a process of filtering, cleaning, warming and
humidification of air. Therefore, the quality of the air that enters the lungs through the mouth is below the proper standard (Hutapea, 2002).

Therefore, the oxygen level becomes very high demand at the time of execution of the sports activity sportsmen often make the process of making the breath through the nose and mouth simultaneously. As has been previously known that the resulting air quality through the mouth is not as if the breath-taking process is done through the nose. Very likely bacteria and air pollutants can enter the raw into the lungs due to air intake through the mouth so that it is feared may have a negative effect on health.

Figure 10: Example of Process Breathing through the mouth and nose at the Sports Activity
(Source: www.health.kompas.com, 2014)

In actual practice in the field of sports making process is often done simultaneously breath through the nose and mouth because of the high demand for oxygen and release carbon dioxide quickly. Best efforts to do by the coach or coaching staff when they can not make athletes take in oxygen through the nose, without going through the mouth, ie by choosing the environment for a practice or game that has good air quality and away from air pollution. With a practice or game environment that has good air quality and air pollution free, this will have a positive
impact on endurance athlete so that the athlete is expected not to get sick due to decreased immunity.

**The Implementation of Digestive System in Sports Performance**

The main function of the human digestive system is to digest the food to be converted into nutrients that can be used as energy for survival and daily activities of individuals. In summary it can be explained that the food and drinks will experience the process of digestion from the mouth, stomach, intestines until the end of the process in the anus. Process food trip takes 2-5 days to cover the tip of the digestive tract, which is located in the stomach 1-6 hours, 4-8 hours in the small intestine and the rest are in the large intestine (Wiarto, 2012).

When linked between the circulatory system and the digestive system, it is known that at rest the blood flow to skeletal muscle by 21%, the rest is distributed to other limbs to varying degrees. It is very different from the current implementation of the exercise with moderate to high intensity. The majority of the distribution of blood flow occurs in the active muscle groups perform sports movements with levels of 88% or increased by 4x higher than at rest.
Figure 11 Comparison of blood flow in the body at rest and during exercise
(Source: www.amazonaws.com)

In order for the distribution of blood flow to the active muscle groups can be increased up to 4x as much, the body responds by reducing blood flow to the other limb. The impact of this principle is the sports practitioners should pay attention to both the distance of time to eat and exercise. Too short a time span between eating and exercise cause the digestive system to work very hard to digest food. In the process of digesting food, the digestive system requires adequate blood flow distribution in order to work optimally.

When the span of eating too close to the sports activities, the distribution of blood flow remains focused on muscle groups that are active in sports activities, while the hull number was reduced blood flow. Without a blood supply, the abdominal muscles will be deprived of oxygen (Mirkin & Hoffman, 1984). The outcome was the occurrence of seizures or stomach cramps. Incidence of stomach cramps on the
achievement of sporting activity is not desirable, because the incident would be lowered sports performance athletes.

Speed of gastric emptying related to the distribution of blood flow that is sent to the stomach. Speed of gastric emptying is influenced by (1) conditioning, (2) the level of emotional and (3) the type of food consumed. With a good level of physical fitness, the heart is able to work effectively and efficiently and able to distribute blood to the muscles and the gastrointestinal tract more optimally. The impact faster gastric emptying occurred despite sporting activities are being carried out. Gastric conditions is strongly influenced by the emotional level. At the time of sadness or other negative stress, the stomach will work more slowly so that the food is more slowly digested (Hutapea, 2002). With good speed gastric emptying, it can reduce the risk of cramps sports activities.

Therefore, a simple application of the digestive system for practitioners of the sport is to maintain or increase the ability of the heart and set the interval athlete eating and exercise activities, both during training and during the match / race. In addition, athletes should try to control their emotions well in order not to get stuck on the negative emotions that will affect the performance of monkeys on the digestive system.

CONCLUSION

Sports achievement is closely related to various fields of science and technology to support and complement each other. One of these disciplines is exercise physiology. Facts on the ground that not all coaches or athletes have the educational background or formal and non-formal in the field of sports is qualified. This leads to a lack of knowledge about exercise physiology. The impact application in the field of exercise physiology as a support in a sport often neglected accomplishments. Therefore, one of the efforts to be made in order to exercise physiology can be implemented optimally in sports achievement is through how to approach the delivery of material drawn from the exercise physiology standpoint sport practitioners. Therefore sport practitioners have the educational background and academic ability then it is important to present a variety of materials such exercise physiology with an easily understood and simple so
that they can better understand the material. With a good level of understanding of the sport it is expected that the practitioner is able to implement the principles of exercise physiology in an effort to support the achievement of optimal performance.
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Abstract

Learning process in determining the success to be achieved, is necessary for good teaching and learning process. There are many factors will determine the success like the means and methods of learning. Table tennis is a small ball sport which is very popular in the community, ranging from children, adolescents, adults and even the elderly. They often play this small ball game or so-called ping pong. However, not all lovers of the game has a good basic movement skill. To be able to play game, basic movement skill is essentially required first. The basic movement skills need to be mastered to be able to play are divided into three categories, namely: locomotor, nonlocomotor, and manipulative. The ability of the locomotor movements used to move the motion in a game of table tennis is a reaction foot. The nonlocomotor movement is used for wisting the body. The manipulative motion is used to move the body in the form of stroke and throw the ball. Table tennis skills formed from the basic motion manipulative though others are also important.

Another problem also arises in an effort to achieve the basic movement is table tennis game that the proper learning methods to quickly master the basic motion properly. Many learning model to control the motion particularly on the basis of table tennis stroke, like service, forehand, backhand or semesh. This paper will discuss wall volley method to train basic. Stroke in table tennis game discusses means or tool sused. That needs are required without adequate tool, the learning process will not happen properly, and of course will impact on learning outcomes, especially table tennis game stroke basic techniques.

Key words: methods, wall volley, skills, stroke, table tennis
A. BACKGROUND

Sports with placement participation ranks number two is the sport of table tennis. Also table tennis is a sport that has become one of the sports that competed in the Olympic Games, and received special attention in the international world. In the development of rapid, table tennis fans are expected to learn and analyze progress deeper into finite details. Thus we will know the latest ways that would bring the players improve the technical quality of play and compete to be moving towards success. We certainly agree that the level of perfection will only come about through a disciplined training system with courage to achieve success.

Table tennis ball is also a sport that is very popular in small communities, ranging from children, teens, adults and even the elderly are often playing small ball game in terms of this or the beginning of the emergence of so-called ping pong. However, not all lovers of the game of table tennis has a base with a good range of movement, but to be able to do this with a good game overs motion essentially required first, as for the basic motor skills need to be mastered to be able to do this with a table tennis game skillfully divided into three categories, namely: locomotor, nonlocomotor, and manipulative. Locomotor movement capabilities are used to move within a game of table tennis that foot reaction, while for motion nonlocomotor used in body position while twisting the body, while the motion manipulative when used to move the body in the form of hit and throw the ball. Table tennis skills is formed from the basic motion basic motion manipulative though others are also important.

The game of table tennis is a sport that is in the school curriculum, which is included in the sports section of small ball game, so that students who majored in sports must master the sport included in the school curriculum, so that later can be mastered very well and can apply it in the world education.
Infrastructure in the learning process is a thing that can not be ignored especially in learning the sport as a key tool in helping to achieve the learning objectives, deficiencies in the means or props alone will result in the learning process can not be run with the maximum, so that the necessary facilities are adequate according to the number who do the learning table tennis.

Method to master the basic techniques of table tennis game that can be mastered basic motor skills to properly appropriate learning methods are needed so that the base motion can quickly mastered properly, many models of learning to be able to master the basic movement of the stroke table tennis in particular, be it service, forehand, backhand or smesh. However, in this paper will discuss a method for learning the techniques of wall volley basic stroke in the game of table tennis, since it is believed to be the way most appropriate for learning basic techniques in the sport of table tennis stroke.

B. THEORY

1. Games Table Tennis

There are various types of games that are played using today's racket and tennis is one of the most preferred games. According to some historical records, the game uses a ball and a racket has been played since before Christ, namely in Egypt and Greece. In the 11th century a type of game called Jeu de Paume, which resembles a tennis game, it has been played for the first time in a region in France. Balls used wrapped with thread while the bat is simply hairy hands.

The game was later introduced to Italy and England in the 13th century and received rave reviews in a short time. Apparently much demand among
local people towards this game. Since the development of tennis continues to rise to European countries other. The meaning of table tennis is a game that uses the table as a field bounded by nets (net) which uses a small ball made of celluloid and the game uses the so-called bat or racket. (Depdiknas, 2003: 3).

Table tennis or more often called ping pong is a sport that knows no boundaries of age, children and adults can play together. Can be considered a recreational events, can also be considered as an athletic sport that should be addressed earnestly. But if we want to master ping pong as a sport, then inevitably we have to learn and understand different strokes (stroke) that is, we must master a variety of styles are also the main game, there may well play ping pong without knowing these basics.

Table tennis is one sport that many fans, not limited to the level of their teens, but also the children and parents, men and women are big enough demand, this is because the sport is not too complicated to do. Table tennis, or ping pong is also called a racquet sport played by two people (for single) or two pairs (for double) are opposite. In China, the official name of this sport is the "ping pong balls" (Chinese Pinyin: Pingpang Qiu) table tennis game began in the 1880s in England. At that time, upper-class Victorian society consider it as entertainment after supper.

At the 1988 Seoul Olympics, table tennis competed for the first time in the event most prestigious sports. Table tennis became a source of inspiration for PONG, a well-known video game that was released in 1972 In the early 1970s, the United States table tennis players were invited to participate in a tournament in China. This event eased the tension in relations between the two countries. The term "Ping Pong Diplomacy" appears when President Richard
Nixon shortly after a visit to China. At the 1936 World Championships in Praha, two players who each apply a holding pattern / defensive takes more than an hour to achieve a single point. The Soviet Union banned the table tennis playing population in 1930 to 1950 by reason of the exercise is harmful to the human eye.

2. Grip in Table Tennis Games

In table tennis bet there are a lot of hold technique. Table tennis games or influenced by the technique holds bet, therefore each player must master the basic techniques of holding the racket. There are some variations in the holding bet. The kinds of techniques hold the bat there are three, namely:

a. Shakehand Grip

Shakehand grip is how to hold the racket that is often used by many players. This holds very effective way to play defense and attack. With this grip shakehand player can easily stroke it firmly to all corners of the table. Holding shakehand grip like people doing handshake (Sapto Adi and Mu'arifin, 1994: 8). Errors and repairs that often occur in learning this grip covers, forehand or backhand feels unstable. In order to overcome this is by turning the inward bet (when holding the front of the body with the shakehand grip) will make the stroke more stable, but less stable forehand. Then turn the top of the bat towards the rear. The inside of the thumb touching the bet resulted in erratic forehand, and stroke the back of hand becomes less effective.
b. Penhold grip

Penhold grip is how to hold the bat as the person holding the pen. How to hold is only used on the surface of the bet. As described (Sutarmin, 2007: 15) Penhold grip or hold the stalk bet can only be used for one surface only bet. This holds very effective way to stroke a forehand, but less effective for backhand. How to hold is only used for the player with the type of attack. Excess play with penhold grib technique is capable of hitting a backhand with fast, easy service when moving the wrist, and the most important is appropriate to stroke a forehand. While the disadvantages of using a penhold grip technique is the difficulty in performing a backhand and ineffective in the last game.

c. Seemiller Grip

Seemiller grip is also called the American grip, which is a version of shakehends grip (Sutarmin, 2007: 19). How to hold almost the same as the shakehand grip. The difference in grip seemiller Bet upper rotated from 20 to 90 degrees towards the body. Attached to the index finger along the side of the bet. Excess seemiller style grip is easy to make the block, easily master the game in the middle of the table, easily make changes to the side bet at the time of games in progress, the wrist is moved to a forehand. Weakness in seemiller style grip is difficulty doing backhand away from the table, trouble shooting a corner, is not effective for a holding pattern.

3. Punch in Table Tennis Games

In table tennis every player must master various types of punch there. There are many types of punches in this game such as punches Drive, Chop, and
many more. In table tennis should be aware of the variety of punches. In addition there are also various types of punch technique and also block servicing techniques. To be a good game and not arbitrary must master the basic techniques as a whole. Begin how service techniques, blocking techniques, to various types of punches. All that must be controlled because it is a unified whole in playing table tennis. After learning the basic techniques correctly expected the player can play well and can minimize errors that occur in a game of table tennis.

Basically there are two techniques that stroke the table tennis forehand and backhand. Forehand has the advantage on the severity rate while the ball will make it easier to backhand backspin and topspin face stroke. Both of these techniques underlying the various types of hitting punches.

a. Forehand Stroke

Forehand do if the ball is on the right side of the body (Sapto Adi and Mu'arifin, 1994: 16). The way to do this is by lowering the punch body position, then move the hand holding the racket towards the waist (if not left-handed movement towards the right), elbow forming an angle of approximately 90 degrees. Now we just move the hands forward without changing the elbow.

b. Backhand Stroke

Backhand do if the ball is on the left side of the body (Sapto Adi and Mu'arifin, 1994: 17). How to do lower the position of the body first and then move towards the waist to the left hand if right-handed, with a 90-degree angle. Move your hand and bet towards the front, keep your elbows 90
degrees and it stays straight bet. As for the type of stroke in table tennis that must be known in table tennis is the drive, push, chop, block, and servicing.

1) Drive Stroke

Drive a stroke with a long swing that produces a hard flat punch (Sutarmin, 2007: 36). This type of stroke hard and fast. How to perform a forehand drive is the first move towards the next bet. This movement followed by a rotation of the body towards the front of the body rotates approximately 30 degrees.

Errors and how to overcome the stroke a forehand drive is a change in position due to the movement of the wrist bet it difficult when contact with the ball. Strengthen the wrist when attitudes beginning, so the bet is not going to be easy to change position. The second is how to do a backhand drive first elbow forming a 90 degree angle. Bet movement followed by a twisting motion of the body. Keep contact with the ball when the bat was left in front of the body somewhat.

Errors that often occur in the drive punch and how to overcome it is the movement of the foot. In order to overcome this is by extending the exercise backhand.

2) Push Stroke (push)

Push is made passive backspin blow to the face of backspin (Larry Hodges, 2002: 64). This punch can keep the ball does not bounce too high of the net. To perform a forehand push a little note in order to open a position bet bet movement forward and slightly downward. Keep the ball on the center of the racket. The second is how to do a backhand push the
ball touch the same as the forehand push this difference using the backhand. Try to contact the ball just happened but strong friction resulting in a perfect backspin ball. Try to touch the ball on the left closer to the front of the body.

3) Stroke Stroke

Chop a backspin blow that is to survive (Larry Hodges, 2002: 99). Preparation of doing the same chop forehand to forehand racket but rather an open position. Move forward leaning bet down. Keep contact with the ball going in the right front of the body. Touch the ball on the front side of the bet rather down and touch on the ball on the bottom side of the ball. As for the backhand chop backhand position equal to the initial bet but the open position or leaning over the front side. Try to contact the ball on the bottom side of the front with the bat down the ball. Try to touch the ball in the left front body somewhat.

4) Block

Block is the simplest way to restore a hard blow (Larry Hodges, 2002: 72). Block performed after the ball bounced off the table. This is done to make your opponent can not attack quickly, because the ball is in the block will be returned quickly. How to perform a forehand move the first block of the next bet, bet the closed position (front side facing down bet). Note the direction of the ball, do block immediately after the ball bounced off the table, touch the ball with the bat right in the middle of the bat. As for the backhand block is located on the left side of the body bet. Move forward bet if you want to do the blocking, closed position bet (bet the front side facing down). Note the direction of the ball, do block
immediately after the ball bounced off the table, with the approval of the ball right in the middle of the bet bet.

5) Service

Servicing the ball stroke the ball to present the first (Sutarmin, 2007: 17). There are several techniques that serve forehand topspin serve, backhand topspin serve, forehand backspin serve, backhand backspin serve. Topspin is the direction of rotation of the ball (where the ball rotates clockwise). Backspin is the direction of rotation of the ball as well (ball rotates counterclockwise).

4. Methods To Exercise Punch Wall Volleyball Table Tennis

The method, according to Hidayat (1990: 60), derived from the Greek: methodos, meaning path or way. In philosophy and science, the method is defined as a way of thinking and checking something under something specific plan, or way of doing things. In the world of teaching methods of presenting material is defined as a comprehensive plan with a systematic sequence based approaches and specific strategies. This confirms the notion that the method is a way of carrying out the work that is based on specific strategies and approaches. That is, approaches and strategies underlying the development of a method.

The method is defined as a way of doing something or how to do the job activities with facts and concepts - concepts systematically (Shah, 2006: 201). Orderly manner used to carry out a job in order to achieve the desired fit, which means applying work to facilitate the implementation of an activity in order to achieve the goals that were set.
In this paper is a method to train blow Volleyball wall in a game of table tennis is bouncing the ball towards the wall and hit it again before the ball fell to the floor repeatedly - again properly covering the forehand and backhand.

5. Hitting Skills in Table Tennis

Skill is the ability to use the mind, thoughts, ideas and creativity in working, change or make something more meaningful so as to produce a result value of such work. skills / abilities that basically it would be better if honed and trained to raise the capabilities that will be an expert or a master of one of the fields existing skills.

Skill is the result of learning in the psychomotor domain, which is formed to resemble the cognitive learning outcomes. Skill is the ability to work or carry out something well (Nasution, 1975: 28). The purpose of this opinion is that the skills and potential ability of any person to master a skill he had since birth. These capabilities are a result of the exercise that is used to do something. Skills (skills) in the narrow sense of ease, speed, and accuracy in motor behavior that is also called a normal skill. While in a broad sense, including aspects of normal skill skills, intellectual skills, and social skills (Vembriarto, 1981: 52). Skills is a pattern of activities that aim, which requires the manipulation and coordination of information learned (Sudjana, 1996: 17).

From a few opinions on the above it can be concluded that the skill is the ability to do something well, fast, and precise. Skills will be achieved or improved by training measures on an ongoing basis. Meanwhile, according to Indonesian dictionary, skill is the ability to complete the task.
While in this paper is called hitting skills in the sport of table tennis game is the ability to punch in a game of table tennis properly which include a serve, forehand and backhand.

C. DISCUSSION

1. The method of training in table tennis

Many training methods to train the basic techniques of punch in a game of table tennis which of course, each of these techniques has advantages and disadvantages. As for some of these methods between judgments:

a. Practicing with other players

This method will probably be the method most often used and also the simplest method. Since it is considered most appropriate to form a table tennis game that is played against itself and it has become the character of every person who wants to play table tennis could wish for a quick play when not able to master the basic techniques.

b. Practice with coach

This method may be the best way to practice, because we will be better able to concentrate on our weaknesses rather than thinking of our opponents, and because we will be given instructions by the coach at the same time. However, the disadvantage of this method of learning the basic techniques will take a long time because it usually consists of only one or two coaches in learning.

c. Practicing alone

We can do some punch techniques without the use of the ball, but as if there is. We can also use a basket of practice balls and serve. The
disadvantage is not being able to train feeling without using the ball because the ball just train movement only.

d. Multiball

It is a method of training where the players were practicing the other players puts the ball. We'll need a basket ball. Feedback providers stand alongside a table, picked up the ball and stroke a row in a range of speeds, rotation, and the direction we need. This method is a great way to learn the punches, but the disadvantage is only one person who can practice at the time. This method is often used by coaches who act as feedback providers.

e. Engine

Have the same table machine means having people who will provide feedback to the ball a lot. This machine can be set up speed, rotation, and its direction with our wishes. This machine may be expensive but it will be a friend training that never tired and wrong and certainly can not be trained in accordance with the actual circumstances. So the weakness is not all institutions or clubs that have machines because it is expensive and also not able to train feeling ball.

From some training methods that are commonly done by coaches, teachers and lecturers sport of table tennis, there are pros and cons but in the selection of the most appropriate method of training is to find the least bit of a weakness for the authors to make a method to train the basic techniques of table tennis in particular in the course of the train stroke some existing assessment methods are as described in the beginning, the method is to train a stroke with the media can be termed a wall or wall Volleyball.
2. Batting nature of Into Wall

Batting practice balls to the wall is often also called the volley wall, wall in English means the wall. While the meaning volley lobbed the ball before the ball touches the floor or ground. So blow the wall volley is carried to the wall by not dropping the ball on the floor. According Yudoprasetio, (1981: 118) wall volley is done before the ball hit the ground. This punch is done to facilitate the players in a master stroke technique.

![Diagram of Batting nature of Into Wall](image)

**Picture Exercise Ball Bounce to the wall**

The purpose of doing that is to measure the wall volley ball hitting skills by using forehand and backhand as much, train movement stroke consistently, train combines punch and training to master the field, as well as to obtain forehand and backhand maximum. Sutarmin, (2007: 32)

The other opinion says, the purpose of doing that is to measure the wall volleyball skills at table tennis playing skill level is. Nurhasan, (2001: 163)

By doing wall drills volleyball (bounce the ball to the wall) tools - tools required are:

a. Table tennis
As for how to do a reflective exercise balls to the wall by using the following table:

a. First - first to stand facing a wall and then train to control the ball, begins with a short punch.

b. Set a target of his own, in which the ball will be directed either to the left or to the right, do it over and over - again.

c. The next train stroke the ball through a combination of punches and leg movements.

d. Where have advanced so exercise performed at a position away from the table. Simpson, (2008: 49)

In doing bouncing ball into a wall techniques need patience to train. The benefits of this technique in practice is easier to train students in both forehand and backhand punches because it requires no opponent can play and train coordination and movement with good punch.

Exercise technique bouncing ball to the wall, has several advantages namely:

a. It is easier to control the ball

b. It's easier to set goals

c. It is easier to coordinate movement

b. It is easier to master the field

c. It is easier to direct the ball
d. Train feeling bales.

To determine the level of skills that strokes using Backboard test (performed for 30 seconds). With the aim of measuring the ability to play table tennis, level of ability is. Tools that are used as stopwatch, a bat, a table tennis table which can be folded, a ball and a wall.
D. REFERENCES


Hidayat, Kosadi. 1990 Strategi Belajar Mengajar Bahasa Indonesia, Binacipta, Bandung.


Abstract

Softball is a team sport modified baseball which have been developed and popular in the USA. It is modified games since it could previously be played by male. George Hancock was the one who started to modify baseball which the purpose was to make the game was plyable in the winter by establishing written rules named indoor baseball. The school is a good starting point to introduce this game. Through school physical education, the effort is to provide modified softball. Several problems which will be explored are why softball needs to be modified. What is the advantage of the modification, and what are the modified forms of softball?

Key words : Modifikasi, softball, Sekolah Dasar

INTRODUCTION

Primary education is a formal education environment which gives various things for the children’s growth and development. Starting from their small family environment, the children will enter the wider school world which absolutely has different situation from their family. Entering the school world, the children are met with the school rules, teachers’ authority, school discipline, and various tight demands. All of them will give big effect and experience for the children’s personality development. Through this school, the children will get interesting experience which is different from their home. Many experts said that primary school age is a game age.
Playing activity for the children is a spontaneous activity as the way to deliver the eagerness. According to Mutohir (2004:104), the advantages of playing are: a) spending the extra energy, optimizing the growth of body parts such as bone, muscle, and organ, c) increasing children’s appetite, d) getting the children to learn how to control theirselves, e) developing various skills which will be used for the whole life, f) improving creativity, g) getting the chance to interact with other children, h) having a chance to be the looser or winner in the game, i) having a chance to follow the rules, and j) being able to develop their intellectual skill. According to Thompson (1992:56), playing is giving the children a chance to get the experience of interesting learning process. Pate states that, children who are lack of the chance to participate in the game tend to get difficulties in achieving the higher motoric skill (1993 : 198).

Therefore, the children will recognize various things, understand the characteristics of certain things through playing, and get the satisfaction and happiness through games. Through games, the children will learn how to interact and recognize other children in the group and work together in various activities. Citation of the various advantages got by the children through game are : 1) games promote physical growth and development, 2) games promote the sociallization process, 3) games aid in development of motor skill, 4) games help develop emotional understanding between and within youngsters, 5) games can use up excess energy on the part of youngster. Based on the citation above, it can be concluded that game can improve children’s growth and development, improve socialization process, help the development of the motor skill, help the development of the understanding among children and be used to deliver the energy as the parts of the children.
MODIFIED RULES AND TOOLS FOR SOFTBALL

Softball is one of the group games which can give the playing experience for the children. The excess of the energy is one of the children’s characteristics which make them be able to do the activities together with their friends in a group. Through game, a child will be able to gain their happiness, to cooperate with other children in his/her group, and try to understand the existing rules. Therefore, some rules which are very tight can be simplified to make it understandable. According to Thomson (1991: 59), changing the rules in order to meet the children’s ability will improve learning process quickly and improve their happiness in doing this activity.

On the other words, modification is needed to make the game is easy to play and to understand. The advantage of this modification is make the implementation easily runs. Therefore, the children are expected to be interest in learning the games seriously.

According to Ausie Sport (1993), modification needs three elements which must be considered by the teacher or the coach, they are: a) field size modification, b) tools modification, c) time modification, and d) rules modification. Mutohir (2004: 107) states that the effect of size, tools, and rules modification will give the students a chance to move in doing the physical education. Children’s motoric skill in the primary school has been developed well.

In line with the development theory, Hurlock (1991: 159) states that good muscle coordination will follow the development theory. Therefore, the hand skill will be able to be learnt first than the leg skill. Honestly, in the beginning of this skill, there will be uncoordinated and unimportant movements.
In line with the motoric skill development, it will be followed the increasing of the movement speed, accuracy, strength, and efficiency. The biggest improvement of the accuracy, according to Hurlock, will happen to the child and the teenager period (1991:158). The picture below shows the difference of ball throwing performance between boys and girls around 7 – 17 years old. The picture below shows the difference of ball throwing performance between boys and girls.

![Picture 1. Ball throwing performance between boys and girls](image)

Since the difference of ball throwing performance between boys and girls is not significant, this game is possible to be played by boys and girls in the same time. The throwing skill is an important thing in this game, because it is one of the basic techniques which must be mastered. Mastering these basic techniques needs to be given as soon a possible to the primary school students to give them modal to move. Unfortunately, the use of tools and rules needs to be thought in order to make the game runs well.

Thompson (1993:58) argues that changing or adapting the technique and tools in order to meet the children’s skill is something that can be done. Therefore, softball characteristics and form must be modified to meet the children’s characteristics/ according to Anarino (1990 : 138), boys’ and girls’ characteristics in the fifth and
sixth grade are prefer to the dynamic game and more movement. Kartini kartono (1990 : 138) states that games loved by the children in that age is enjoyable game.

According to the children’s characteristics as described above, softball is a game which can make the children be happy in the game. Movements in this game such as batting, throwing, catching, running, and jumping will be met frequently. Therefore, the children will get various experience and movement which can improve their physical and mental development unintentionally.

The way to modify the softball game is a way to introduce the primary school students to the softball. Therefore, besides adding the movements, this game also is able to help children in the school, especially at N 1 Ratahan primary school.

Softball is a group game which demands good individual skill and individual technique. Mastering these skills need longer time. Thompson (1991:151) argues that the process of mastering this skill is a long term period, while Pate (1993:197) argues that movement skill is achieved gradually and in sequence before they achieve the higher level. According to Bompa (1986: 18-19), the basic to get specialist in certain skill functionally is a complete development. Based on some arguments above, it can be concluded that mastering certain skill cannot be done in short time. On the other hand, mastering certain skill needs longer time through skill levels which meets the growth and development period.

A teacher or a coach must be able to control herself/ himself from developing the special and narrow activities. However, developing larger physical skill and basic skill, especially physical preparation is one of the important basic demands to achieve the higher mastering level.
Once, the child enter a certain training or skill learning, a teacher or a coach must have a certain approach which is directed to the body functional development appropriately, therefore the activities form will have various movement which creates the happiness in doing such activities. It can decrease the boredom in their activities or game. According to Pate et al, (1993:119), sometimes there is a tendency to make the children play by using the rules which causes their learning experience does not meet their development level. For example, asking the 8 years old child to play basket by using the real size ball and the height of the basket is 3.05 meter. It will cause the children to add the movements which are related to the game. Moreover, pate et al delivers that the result of the performance above will cause: 1) the children will be frustrated by the continued failure they get and lack of the interest to do the activity, 2) the wrong activities will give negative effect to the further skill development.
The problem found is the steps and the tools and equipments used are still expensive and very difficult to be developed at school. Based on that point, this game needs to be simplified or modified. According to Thompson (1993:59), the bigger tools and equipments used, the bigger constrains faced in the learning process of basic techniques.

MODIFIED SOFTBALL

The example of the modified softball made by Morris (1976: 73-76) is as follows: 1) there are two groups of 6-10 children, 2) the equipment needed are: bat, ball, 1 base and 1 home plat, 3) the movements needed, hitting, fielding, running, throwing, and catching, 4) the softball form or design.

![Picture 3. The example of modified softball](image)

Implementation

This game aims to develop the basic skill of the softball from the base running strategy. The changing of the defensive group and fielders group will be done if there is out twice or 5 run. Pitcher is a teacher or coach. The distance between pitcher and
batter is not decided. The children must do the bat correctly or fair ball. A certain batter is out when: 1) the defensive group can catch the ball, 2) the defensive group stop the runner by ball before reaching the base or home plate, 3) the ball has reached the base before the runner., 4) batter can throw the bat till go out from the batter box. The distance between base and home base is 30-40\(^0\). Based on the description and the example of modification above, the writer tries to give some types of softball modification. Therefore, by using this modification, the children will play this game easily. Some of the modifications are as follows:

**Modification to develop batting skill and catch the fly ball**

Tools and equipments: tennis ball, batting tee, bats or rounders.

Modification: preparing the rules and exclude some of the equipments such as glove, mask, leg guard, and helmet. The developed activities: batting and catching the ball.

The number of the players: 10-15 players for each group (a class is divided into two groups). It consists of boys and girls. The players from each group consists of 10-15 players (1 class).

Implementation: 1) the groups are divided into two: defensive and offensive groups, 2) the rotation of both groups will be done if there is 3 out, 3) the way to bat is by batting the ball as long as the ball is put on the batting, it can be decided that the batting is fair ball, 4) the batting which is called as fair ball is the ball which reaches the 10 meters from batting tee. 3) If the ball only on the grounds for three time, a batter will be out, 6) point 1 will be get if the offensive group cannot catch the ball, 7) the way to stop it is by catching the ball from the batter. The general regulation is the
sequence of batters is started by the smallest number, if there is a rotation between both groups, the sequence of the batters is continued by the last sequence of the related group do the previous offense and if the batters achieve the area out of the line, the batter will do it again till it is considered as the correct one. The game form and type can be seen in the picture below:

![Picture of Softball formation](image)

**Picture 4 Softball formation**

**The modification to develop the skill to bat the ball, throw and catch, and improve the running skill.**

The equipments used are tennis ball, batter or rounders, batting tee, and base. The modification is conducted by simplifying the rules and excludes the equipments such as glove, mask, and leg guard. The players consist of two groups. Each group consists of 10-15 boys or girls. The developed activities are batting the ball, running, catching and throwing the ball. Implementation: 1) the group is divided into two groups, they are defensive and offensive group. The rotation of the groups will be done if there is out for three times (out), 2) the way to bat is by batting the ball as long as the ball is put on the batting, it can be decided that the batting is fair ball, 3) after doing the correct batting, a batter must run to achieve the base 1, and if it is possible
the batter can continued to the next base, 4) point 1 is got if the batter can achieve the base, when a batter can go back to the first place after reaching the base 1,2,3, and home, the batter will get 4 points, 5) the way to stop it is by burning the base before the batter achieve the base, touching the batter in the middle, or catch the fly ball.

The general rule is if there is a batter in the base, every batting conducted make the batter go out of the base to achieve the next bat, each base is only occupied by one batter, one batter will be out if he/she cannot do the batter for 3 times in sequence, the batting is correct if the ball can achieve the fair area and the sequence of the batter start from the smallest to the biggest number. If there is a rotation between both group, the there is a rotation between both groups, the sequence of the batters is continued by the last sequence of the related group do the previous offense.

CONCLUSION

Softball is a game which has various motions which can stimulate children’s growth and development. The motions consist of batting, throwing, and running. This game needs some tools and equipments which actually cannot be used by the primary school students. Therefore, the modification is needed. The tools and the equipment used must be modified. It is very important since the primary school children period is the period where they love playing, spend their spare time, and their excess energy. The advantages of this modified game that is can be played by the primary school children. On the other words, it can be played not only at school but also out of school.
Reference


Improving Flexibility, Balance, and Coordination with PORPI Yoga Gymnastics among Indonesian Middle Aged

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Abstract

PORPI Yoga gymnastics are kinds of exercises which include soft movement, mid and low intensity, dynamic, and static. PORPI yoga gymnastics, it is expected to be able to improve and maintain physical fitness from middle aged. This research is purposed to examine the improvement of back flexibility, static balance, and eye-hand coordination which are caused by PORPI Yoga gymnastics. The data are collected through the measurement of back flexibility, static balance and eye-hand coordination.

The number of the improvement which is caused by exercise is analyzed by using simultaneous confidence interval 95%. The results are the modification of PORPI gymnastic and yoga gives the improvement back flexibility min 3.79 cm, the improvement of static balance min 7.08 seconds and the improvement of hand and eye coordination min 16.18 seconds. The conclusion of this research is modification of PORPI yoga gymnastics exercise is effective to improve back flexibility, static balance, eye-hand coordination in middle aged.

Keywords: PORPI yoga gymnastics, flexibility, balance, coordination, Indonesian middle aged
INTRODUCTION

Various ways can be done to solve the changing in the age of 45-49 years old. It can be in the form of discipline in arranging the healthy diet, consuming medicine, and doing exercise such as gymnastics. One of them is respiratory gymnastics which is developed by PORPI (Indonesian Respiratory Sport Association). Gymnastics groups which are included as the member of PORPI are the gymnastics which focus on the respiratory sports. The relaxation effect of PORPI Gymnastics will be achieved through soft, slow, and rhythmic motion. It also needs abdominal breathing. Since it is soft, slow, and natural, automatically, this gymnastics will not give bad effect or risk (Airlambang, 2001).

Yoga is one of the alternative daily sports which also can be used as healthy life style (Ahira, 2001). The useful training for the body balance and mental health is the main goodness of yoga. One of its characteristics is using soft and which can make use not be tired and lose a lot of energy. On the other hand, we will be more energetic and fresh because this training is collecting the energy. The motion on yoga more focuses on the calmness and balance which absolutely affects positively to the physical and mental health (Wiadnyana, 2010).

Modified PORPI gymnastics and yoga is a mix between both gymnastics. The research conducted by Kushartanti, Nopembri, Siswantoyo (2011) develops the holistic relaxation model (Combined between Taichi, Makoho, Yoga, and breathing system. It consists of: warming up, main, and closing. It has 3 Taichi motions, 12 yoga motions, 7 Makoho motions and breathing system in each motion interval which is conducted in 10 minutes for seven days. The result of this research shows that Holistic relaxation model can decrease the stress. Moreover, body balance is the
combination of three types of gymnastics. They are Taichi, Yoga, and Pilates. Those three gymnastics can be used to integrating and balancing the body system because it combines the relaxation and meditation motions. It also can be used to decrease stress, prevent disease, and balance the body, thought, and emotion (Tjhia, 2011).

A sport type which has low impact and moderate or low intensity such as PORPI gymnastics has soft and rhythmic/dynamic motion. Yoga is a calm and static motion. By combining both dynamic and static motion, it is very appropriate to maintain the body fit for people under age 45-59 years old.

METHOD

This research uses experiment method by using pre-post test design. The characteristic of the sample is similar. There are 15 people as the sample. The sample is given PORPI gymnastics and yoga. The training system used is PORPI gymnastics in the first series, Yoga: asanas, meditation, and relaxation. It is done in 3 times a week for 2 months.

The data used in this research is collected through test and measurements of back flexibility by sit and reach test (Ratamess, 2011), static balance test by using stork stand test (Johnson & Nelson, 1986), and hand eye coordination by using mirror drawing test (Menegpora, 2005). The data which has been collected is analyzed by using Multivariat analysis (MANOVA), paired Comparisons Techniques by using Hotelling’s Taking ($T^2$) $T^2 > F$ tabel, therefore Ho is rejected and $\delta \neq 0$. After using those techniques, simultaneous confidence intervals 95% is used, (Johnson, and Wichern, 2002).

RESULT
Tabel 1. The result of Manova analysis result by using *Paired Comparisons*

**$T^2$ Technique**

<table>
<thead>
<tr>
<th>Training types</th>
<th>N</th>
<th>$\overline{d}$</th>
<th>$T^2$</th>
<th>$42/12 F_{p,n-p}(\alpha)$</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>PORPI Yoga</td>
<td>15</td>
<td>8.3348</td>
<td>125.022</td>
<td>12.215</td>
<td>(F tab. $\alpha$ 0.05$ = 3.49) There is improvement in the SR, BB, MD</td>
</tr>
</tbody>
</table>

Based on the Manova analysis by using paired comparisons technique $T^2$ in the modified PORPI Gymnastics and Yoga, the result of $T^2$ is 125.22 > 12.215. Therefore, Ho is rejected if $T^2 > F$ table. It can be concluded that modified PORPI gymnastics and yoga improve the flexibility, balance, and coordination.

**Tabel 2. The result of *Simultaneous Confidence Intervals 95%* (\(\alpha 0.05\)) analysis by using dependent Variable**

<table>
<thead>
<tr>
<th>Training types</th>
<th>Dependent variable</th>
<th>Average Coefficient ($\overline{d}$)</th>
<th>Simultaneous Confidence Intervals 95%</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Margin bottom</td>
<td>Margin Up</td>
</tr>
<tr>
<td>PORPI Yoga</td>
<td>SR</td>
<td>5.33 cm</td>
<td>3.79 cm</td>
<td>6.87 cm</td>
</tr>
<tr>
<td></td>
<td>BB</td>
<td>10.47 second</td>
<td>7.08 second</td>
<td>13.87 second</td>
</tr>
<tr>
<td></td>
<td>MD</td>
<td>-34.933 second</td>
<td>-53.68 second</td>
<td>-16.18 second</td>
</tr>
</tbody>
</table>

It is continued by *simultaneous confidence interval 95%*. The result is that modified PORPI gymnastics and yoga increases the back flexibility (SR $\delta_1$, the
average is $3.79 < \delta_1 < 6.87$. Therefore, the improvement of $\delta_1$ is higher than 3.79 cm. It also improves static balance (BB $\delta_2$), the average is $7.08 < \delta_2 < 13.87$. Therefore, the improvement is 7.08 second. It also improves eye hand coordination (MD $\delta_3$), the average is $53.68 < \delta_3 < -16.18$. Therefore, the improvement of $\delta_3$ is bigger than 16.18 second.

**DISCUSSION**

Modified PORPI gymnastic and yoga is a kind of training which consist of dynamic and statics motion. It is started by the PORPI gymnastics which has dynamic motion and is continued by the static motion in Yoga. The result of the research written in *Medicine & Science in Sport and Exercise* 33(3), pp.354-358 and *Journal of Strength and Conditioning Research*, vol 15 (1): 98-101 shows that the use of dynamic stretching-soft motion which are controlled by various motions is the most appropriate training for warming up. On the other hand, static stretching is more appropriate to be used in the end of the training (Tollison, 2007).

In the combination training or modified PORPI (Taichi) gymnastic and yoga give more advantages through integrated approach to train strength, flexibility, balance and aerobic skill. Modified Taichi Yoga gives advantages to body, mind, and spirit which can repair the bond density and improve the cardiovascular ability (Grunert, 2009). Based on the study conducted by Haykowsky in 2005, he found that the combination between aerobic and strength training is more effective to improve elderly people’s muscle strength than we do it separately. We can conclude that combination training is more effective. Another study found that the combination between aerobic and strength training also can decrease the depression on the elderly people (Adriana, 2008).
To be more effective, a certain training program must start their training by
dynamic motion as the warming up which is used to prepare the body for the
adaptation with the training and in the competition, moreover, it is finished by the
static motion as the cooling down as the training for the injury muscle (Silvera as
cited in Tollison, 2007; Sharkey and Gaskill, 2006).

The Improvement in the flexibility

Modified PORPI gymnastics and yoga improve the back flexibility for 3.79
cm. The effect of this modification is because of the mix between dynamic and static
motions. According to Kurz, the dynamic stretching will involve the body to do the
motion gradually to gain the motion speed (Tollison, 2007).

When the dynamic stretching is put in the warming up activities, it can
improve the static and dynamic flexibility. The flexibility and muscle performance or
the vulnerability of the athlete to get the injury is caused by the lack of flexibility.
Dynamic flexibility improves body temperature, muscle temperature muscle length,
stimulate the nerves system, and decrease the injury possibility (Fredrick, 2001). The
static stretching has been used for two major reasons. They are for preventing the
injury and improving the performance, (Brandon, 2001). Regarding to the result of the
research of yoga compared to walking, the conclusion is that walking can improve
cardiovascular endurance while yoga can improve flexibility (Khodaskar and Manjre,
2012). It can be concluded that modified PORPI gymnastics and yoga improve the
flexibility, which is caused by the dynamic motion and can be used to adapt the
training which meets the training, while static motion is prepared to prevent the injury
(Sharkey and Gaskill, 2006)
**The improvement of the balance**

The training of PORPI Yoga gymnastics increases the static balance for more than 7.08 seconds. Moreover, the variable of motions balance in modified PORPI yoga can be used to integrate and to balance the body system because it combines the relaxation and meditation motion. It also can be used to decrease the stress, prevent the disease, and synergize the body, mind, and emotion. Since the motion has been adapted, it is not difficult and it focuses on the calmness and balance which affects the physical and mental health (Ahira A., 2011; Wiadnyana, 2010, Tjhia F., 2011). The regular training of yoga can increase the balance for elderly people because the problem of balance is the factor of fall down and instability. Elderly people get the decreased on the proprioceptive function which affects their balance (Wahyuni, 2012).

**The improvement of the coordination**

The PORPI gymnastics and yoga decrease the eye and hand coordination for 16.18 seconds. This research shows that the static stretching decrease the eccentric strength to 60 seconds after getting the static stretching. It is proven that it can decrease the muscle stretching to 9% in 60 minutes after stretching and decrease the eccentric strength for 7% after it is followed by hamstring stretching. Gerard van der Poel states that the static stretching decreases the specific coordination form explosive motion (Critchel, 2002).

Therefore, repairing and improving the coordination needs dynamic and static motion training. The dynamic flexibility improves the body temperature, muscle temperature, muscle length, stimulate the nerves system and decrease the possibility of injury (Frederic, 2001) while static stretching cannot be used in the warming up but
it can be used in the cooling down section (Silveria as cited in Tollison, 2007). There is a possibility to consider the appropriate time to do the static stretching in the daily training, because the role of the static stretching is to prevent the sports injury.

CONCLUSION

Based on the research, it can be concluded that PORPI gymnastics and Yoga improves the back flexibility, static balance, and eye hand coordination. PORPI gymnastic and yoga is very appropriate to be used as motion systematic which has dynamic and static motion and appropriate for certain training program.

REFERENCE


Silveira, G., Sayers M., Waddington G.,… “Effect of Dynamic versus Static Stretching in the Warm-up on Hamstring Flexibility”, ISSN: 1543-9518


Abstract

Jumping smash Badminton is the most powerful offensive hit. seen in the logic, the person doing the jumping will add to the height of power achieved the player when doing blow. This will hopefully make the opponent's difficulty in returning because of a sharp shuttlecock, high and sharp smash to shut down opponents. The purpose of this research is to know the influence of exercise arm power and leg muscle strength with weight training (leg press and shoulder press) and (sitting calf and chest press) to the accuracy of the blow jumping smash; and knowing the difference of exercise effect arm power and leg muscle strength with weight training (leg press and shoulder press) and (sitting calf and chest press) to the accuracy of the blow jumping smash.

The subject of this research is the SAU student Badminton Unesa and the number of samples taken as many as 30 people were divided into 3 groups (2 groups of experiments and 1 control group), with each group of as many as 10 people. The method in this analysis using statistical methods, quantitative and comparative desikriptif.

Based on the results of data analysis it was found that there was significant influence awarding of exercises (leg press and shoulder press) and (sitting calf and chest press) to the accuracy jumping smash on SAU student Badminton Unesa. And there is a significant difference between the results of the group exercise (leg press and shoulder press) and (sitting calf and chest press) against the accuracy jumping smash. Summary in this study is an exercise leg press and shoulder press have a better influence on the training of the sitting calf and chest press against the accuracy jumping smash on SAU student Badminton Unesa.

Keywords: Jumping Smashes, Badminton, Accuracy

INTRODUCTION

Badminton sports in physical needs present a greater emphasis on components of the extra speed and power. As with any physical changes also will change the pattern of the game in accordance with the opinion of the Wismanadi in his dissertation that
"patterns of badminton sports games currently known by the name of speed and power games" (Wismanadi, 2010). The application of the system of the rally point also forced the players to play fast and precise. From the pattern of the game changes, automatically also different physical needs physical needs when game 15.

The physical conditions required different sports with badminton in the other. Here's the explanation according to PBSI (2001-2005) which is "a prime physical condition among the factors of strength, durability, flexibility, speed, agility and good motion coordination". According to the explanation of Chau Yap (2006) States the physical research on badminton badminton players showed that the component should have a physical condition such as muscular strength, power, local muscle endurance, kelentukan and body athletic. In addition, Dinata and Tarigan (2004) States that "the physical training of badminton emphasized to agility elements, power, endurance, and speed muscle". Sugiarto also stated that the physical components include elements of strength, reaction time, speed, endurance, agility, coordination, power, kelentukan, balance etc. (Sugiharto, 2004). So be aware of some of the opinions above that the exercise or physical condition required in the sport of Badminton is more emphasized on muscle strength, agility, speed, and power.

The physical condition of all components that have been mentioned are very supportive to make movement in playing badminton. It is made clear from Asdep PTPK (2007) that "the Foundation of physical accomplishment, for building techniques, tactics and psychological state can be well developed when the athlete has a good physical quality provision".

Power on this research focused on the arm power that includes several supporting muscles in doing blow jumping smash. According to the journal of china said that, there are some muscles that support the movement of jumping smash them on the
upper limb i.e. wrist movement fleksi and extensions, Tricep, deltid and pectoralis major (Chien-Lu et al., 2005).

The application of important muscle power is seen from the point of view of sports, since it required athletes to generate power which is great in a limited time. Power play an important role in the sport of badminton, especially at a time when hit. Power is indispensable for the performance of units must be completed with as best as possible in a short time.

Opinions of Chandler and Brown (2008) Power can be increased with greater activity in the same amount of time or by doing the same activity in a shorter time. Arm power is a movement performed by explosive. That is, a person's ability to use the power muscle arms are deployed in maximum in a short time when doing punch jumping smash in badminton game.

The following methods of the exercise of power arms, among others, Harsono (2001)

Training intensity : 40%-60% (Sandler, 2005)
Reps : 12-15 RM
Number of sets : 3-5 sets
Recovery : 2-3 minutes

The rhythm of the movement: fast

Power limit can be summed up as follows: Power is the ability of a muscle to exert maximum strength in a very quick time. Therefore exercise power in weight training should not only emphasize on the load, but must also speed lifting, pushing or pulling a load. Therefore must be raised quickly, then by itself could not load weighing heavy weights for strength training. But it also should not be too light so that the muscles don't feel the burden of stimulation. His load also should not be too heavy so the
optimal transfer of the strength to power does not occur. So power is urgently needed to carry out deadly attacks hit the opponent.

Exercise arm power in the awarding of the load can be done after going through the stages of arm power in a way pretes data retrieval were heavy balls, throw away, and the ball off of the hand to touch the floor. Next up is done using the formula calculation process power conducted tests with Medicine Ball Quadrathlon with Standing Javelin Throw.

\[ P = \frac{\text{Force} \times \text{Distance}}{\text{Time}} \]

(Mackenzie, 1996)

More smash hit movement is dominated by the movement of the arm. Therefore, it is necessary a good motion coordination of movements as in blow lob quickly turned into a smash hit that can be used to surprise the opponent. Thus, the faster the change is done then more and more of the movement components are to be coordinated.

In addition to the arm power that is used in the process of jumping smash hit, but the limb muscles also has active in the implementation of such a blow. Because bending legs will make a donation to enforcement beatings jumping smashes, bending the legs done to do the object with the aim of stepping up will be generated.

Strength training really needs to be applied in accordance with the explanation of Sukadiyanto which States that "power should be increased as the underlying foundation in other components of the biomotor (Sukadiyanto, 2011). Because if strength training it's done correctly, it will affect the rise and the other of whom biomotor components, speed, muscle endurance, coordination, explosive power, agility and kelentukan (Sukadiyanto, 2011).

As a guide to strength training, according to Harsono(2001) explains that "for sports power is not too overpowering like table tennis, badminton, softball, tennis, and
the heavy burden that takraw is used with a range of between 8-12 reps RM. Bompa in the book explain the intensity of 70-80% of it was included in medium load (Bompa, 2009). According to the explanation of Mackenzie (1996) for effective muscle development results, any form of exercise that for acyclic group exercise conducted in the following way:

- **Training intensity**: 70%-80% (max load)
- **Number of sets**: 3-5 sets
- **Frequency**: 3 times a week
- **Recovery**: 3-5 minutes

Implementation of the exercises arm power and leg muscle strength is carried out using weights. According to Hoffman (2012) is a weight training exercise modality that is famous for its role in improving performance with improving muscle strength, power, and speed, hypertrophy, muscle endurance, performance, balance and motor coordination. According to Chandler and Brown (2008) that "very commonly used weight training to increase muscle strength because it has been proven to improve nerve function and increase the muscle fibers generate power capacity through increased cross-sectional area". weight training is a common type of strength training to develop the strength and size of skeletal muscles.

Weight training when implemented correctly, in addition to improving overall physical health, can also develop speed, power, strength, and endurance. According to Usman (2010) that "weight training aims to improve the quality and the ability of the organs of the body that play a role in the game of badminton".

Jumping smash Badminton is the most powerful offensive hit in badminton. This hit are often used by multiple players, but even a single player takes a blow though takarannya more in doubles. Clarified by Usman (2010) that "the double games
require high speed, continuous emphasis through smash-smash or drive-drive as well as mere-mere in order that your opponent is always lift the ball". According to Grice (1996) that "jumping smash need energy very much and can be exhausting you quickly". In order for the players not having exhausted the means and can do a jumping smash to blow more frequently. Then, one required an exercise with weight training, because according to Sugiharto (2004) smash with the springboard is very big energy need cover, the position of the legs, round body, swing arm and wrist, and fingers are done simultaneously. Reinforced by the Alhusin component in the implementation of the physical condition of the blows which required jumping smash the strength of limb muscles, shoulders, arms, wrist flexibility, as well as coordinating a harmonious body motion (Alhusin, 2007). Because we know that the goal of jumping smash hit is to turn off the game to quickly by making a point of falling shuttlecock who whet possible. Then, required an exercise that is focused on the arms and legs. From here it required an exercise of arm power and the power of limb muscles.

Based on observations, that the players and the Indonesia badminton observers say that almost a majority of the players are very small to make Indonesia smash with leap or jumping smash. Different from abroad, mostly the pattern games badminton athletes abroad (China) rely heavily on jumping. When viewed logically, people doing jumping will add to the height of power achieved the player when doing blow. This is evident in some of the matches that followed by the players, the mainstay of Indonesia's TaufikHidayat and Simon Santoso in the Li Ning China Open Superseries 2011 obtained from youtube. Analysis of the results of the match between taufik versus Lin Dan, jumping smash hit done by Taufik entered 11 times, 1 time out. In contrast to the jumping smash hit done by Lin Dan as much as 17 times in, 1 time out. So too with the results blow against Simon when Chen Long as much as 15 times
in, 5 out. While Chen Long hit blow jumping smash as much do 34 times, 1 out. Results blow made with the results of the Badminton SAU student blows his best as much as 10 times in one game. From here it is also seen that the deterioration of the Badminton accomplishment also caused one in terms of the physical. When legendary players with his shot when Hariyanto Arbi, among others, a match known as the blow jumping smash 100 Watts, Lim Swie King known as hit jumping smash (Setyautama, 2008). Now that Indonesia has no players nicknames-nicknames special besides Taufik Hidayat with the fastest backhand hit.

Jumping smash implementation requires a coordination complex of movements, movements that one of the factors the strength of limb muscles and the power factor of the arm that would later give influence on the results of the accuracy of the blow. Made clear in the results of his research (Suratman, 2003) that power the arm height gives a better influence on the accuracy of the blow smash full compared to low power arm. The energy generated by arm muscles cause a head racket swing with toned moved to the shuttlecock during the collision occurred (Johnson, 1990, Suratman, 2003). So swing the racket toned will thrust shuttlecock with high speeds anyway. Thus a high arm power will more easily direct blows smash the target area to reach the side of the opponent's side of the field (Suratman, 2003).

METHOD

This research uses a quantitative approach to the types of experiments. The research design used was randomized control group pretest-posttest design, this design approach is perfect, considering there is the control group, there is a treat, the subject of randomly placed, and the presence of pretes and postes to ensure the
effectiveness of a given treatment. Because of the advantages that can be owned, this design is more preferred by researchers (Maksum, 2007).

The population according to the Riduwan (2008) is an object or subject in a region and meet certain conditions related to the research problem. Student activity units in the population (SAUs) Badminton as much as 40 students consists of several departments. This research uses the athletes who have high technique in playing badminton, especially in terms of doing jumping smash hit. Therefore, it should be done using a sampling method sampling purposive. Where did Sugiyono (2010) purposive sampling is a technique of determining the sample with a particular consideration. the sample in this research is the athlete Badminton Unesa SAU amount 30 people.

In this study there are two variables that underpin this research. In explanation (Maksum, 2007) that the variables are classified into the free variable (the independent variable) and variable (the dependent variable). Free variable defined with variables that influence, while the variable is the variable that is affected. Free-variables consist of exercises aarm power and leg muscle strength using weight training (Shoulder Press and Leg Press) and (Chest Press and Sitting Calf). While the dependent variable is the accuracy of the blow jumping smash.

Instruments in the research there are two parts that is used to test among others back and leg dynamometer to test the strength of limb muscles, the medicine ball to test power arms and a Badminton Court to test the accuracy of hit jumping smash. Whereas the instruments for the treatment of fitness tools including a pair leg press and shoulder press in Group I and sitting calf and chest press in Group II.

The technique of data collection was done with procedures that are set as follows: 1) SAU Student collection of badminton; 2) sample selection process with a
purposive sampling method; 3 random sampling process); 4) implementation pretes; 5 maximum load for retrieval) group preferential treatment; 6) maximum load data processes culture; 7) after 2 months of treatment over the next post test data retrieval on the all group.

The analysis used in the study are using some of the techniques of data processing namely mean, normality tests, homogeneity test, paired t-test, ANOVA and Post Hoc test.

Hypothesis test requirements

To test whether the results of the descriptive analysis above is significant or not, then the next will be a test of significance which is also a test of the hypothesis. The things that are necessary to know the test hypothesis in the analysis of this research are as follows:

1. test for Normality

To test the average distribution of the data, in the research by using the calculation test One-Sample Kolmogorov-Smirnov. According to Sulistyo (2010) test for normality meant to show that samples taken from a normal distribution populations.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Leg Press &amp;</td>
<td>Sitting Calf &amp;</td>
<td>control</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Shoulder Press</td>
<td>Chest Press</td>
<td></td>
</tr>
<tr>
<td>hit jumping</td>
<td>Pre test</td>
<td>Post test</td>
<td></td>
</tr>
<tr>
<td>smash</td>
<td>Pre test</td>
<td>Post test</td>
<td>Pre test</td>
</tr>
<tr>
<td></td>
<td>Post test</td>
<td></td>
<td>Post test</td>
</tr>
</tbody>
</table>

245
Based on the above table shows that the magnitude of the value of Asymp. Sig (2-tailed) overall figures that showed greater than 0.05. According to the test criteria can be said that all the normal Distribution data.

2. Homogeneity Test

Its homogeneity test is performed to determine if a dependent variable data have the same variant in each category of the independent variable. According to Sulistyo (2010: 52) test is used to show that two or more groups of data samples come from a population that has the same varians.

Table. 2

*Dependent variable:*

*Accuracy hit jumping smash*

<table>
<thead>
<tr>
<th>Group</th>
<th>Sig.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>GroupI</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leg Press &amp; Shoulder Press</em></td>
<td>0.319</td>
<td>0.769</td>
</tr>
<tr>
<td>GroupII</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sitting Calf &amp; Chest Press</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the table above shows the calculation of its homogeneity test result data that is homogeneous. Because according to the test criteria that if the value is Sig. > 0.05 then Ho accepted. So it can be concluded that all of the data from all three postespretes and such groups have the same variant (homogeneous).

B. Hypothesis Testing

This section will test the hypothesis put forward based on tabulated results of data obtained from a test given to athletes. Then the results tabulate the data processed and analyzed statistically to test the hypotheses that have been proposed before.

1. Test Different Curvatures for Paired Samples (Pretes and post test)

To answer the hypotheses have been proposed, then the analysis of the test used in this study is testing the mean difference (difference of mean test) using paired t-test analysis of the t-test. The value used in the calculation of test-tpaired t-test is value pretes and postes of the respective groups (Group I, group II and group III). Based on the results of the calculation table below the mean sample paired difference test using t-test paired t-test as follows:

<table>
<thead>
<tr>
<th>Accuracy hit jumping smash</th>
<th>Mean</th>
<th>Sig. (2-tailed)</th>
<th>Description</th>
</tr>
</thead>
</table>

Table. 3
<table>
<thead>
<tr>
<th>Group</th>
<th>Pre test</th>
<th>Post test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>23.40</td>
<td>28.50</td>
<td>Significant</td>
</tr>
<tr>
<td>Group II</td>
<td>23.22</td>
<td>26.00</td>
<td>Significant</td>
</tr>
<tr>
<td>Group III</td>
<td>22.9</td>
<td>23.1</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

a. Group I (Leg Press and Shoulder Press)

Results calculation of the test-t paired t-test on the leg press exercise allotment and shoulder press to see the value of Sig. (2-tailed) 0.000, then it can be inferred that Ho is rejected because the value is accepted and Ha Sig. = α value 0.000 < 0.005. In other words, there is a significant influence of the awarding practice leg press and shoulder press against the accuracy of hit jumping smash Badminton athlete SAUUnesa.

b. Group II (Sitting Calf and Chest Press)

Results calculation of the test-t paired t-test on the leg press exercise allotment and shoulder press to see the value of Sig. (2-tailed) 0.003, then it can be inferred that Ho is rejected because the value is accepted and Ha Sig. value α = 0.003 < 0.005. In other words, there is a significant influence of the awarding practice sitting calf and chest press against the accuracy of hit jumping smash Badminton athlete SAUUnesa.

c. Group III (control group)

Results calculation of the test-t paired t-test on the conventional practice of granting by looking at the value of Sig. (2-tailed) 0.735, then it can be inferred that Ho and Ha was rejected because the value of Sig. 0.735 > value α 0.005. In other words there is
no significant influence on the accuracy of the blow jumping smash Badminton athlete SAUUnesa.

2. Test the mean Difference between groups (Anova)

Testing the mean difference between groups simultaneously done using analysis of variance (Anova). According to Sulistyo (2010: 130) One-way Anova analysis was used to examine the mean comparison of multiple groups of data.

Table 4

<table>
<thead>
<tr>
<th>Source Of Variation</th>
<th>df</th>
<th>F calculate</th>
<th>Sig.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2</td>
<td>12.473</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>In Group</td>
<td>27</td>
<td></td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the above table results of test calculations difference between groups using One-way Anova can be concluded that there is a difference between the average results of the group, because the calculation result shows the value of Sig $\alpha$ value 0.000. $< 0.05$, then it can be said that Ho is rejected and the Ha are received. In other words that there is a significant difference between the results of the group exercise leg press and shoulder press, group sitting calf and chest press, and a control group of
accuracy jumping smash Badminton athlete SAUUnesa. With distinction the mean, then the calculation result will be continued by using Post Hoc Test.

3. Calculation of Post Hoc Test

Table 5

Multiple Comparisons

Dependent Variable: accuracy hit Jumping Smash

<table>
<thead>
<tr>
<th>(I) Group Exercise</th>
<th>(J) Group Exercise</th>
<th>Mean Difference(I-J)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg Press and Shoulder Press</td>
<td>Sitting Calf and Chest Press</td>
<td>2.30000(*)</td>
<td>0.027</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4.90000(*)</td>
<td>0.000</td>
</tr>
<tr>
<td>Sitting Calf and Chest Press</td>
<td>Leg Press and Shoulder Press</td>
<td>-2.30000(*)</td>
<td>0.027</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2.60000(*)</td>
<td>0.013</td>
</tr>
<tr>
<td>control</td>
<td>Leg Press and Shoulder Press</td>
<td>-4.90000(*)</td>
<td>0.000</td>
</tr>
<tr>
<td>LSD</td>
<td>Sitting Calf and Chest Press</td>
<td>-2.60000(*)</td>
<td>0.013</td>
</tr>
</tbody>
</table>

Based on the results of the calculation table 4.10 above can be interpreted as follows:

1. the results of the exercises (leg press and shoulder press) and (sitting calf and chest press) differ significantly with respect to the accuracy of the blow jumping smash, with the difference of 2.30000 and the value of Sig. = 0.027 < 0.05.

2. the results of the exercises (sitting calf and chest press and leg press and shoulder press) differ significantly with respect to the accuracy of the blow jumping smash, with a difference of -2.30000 and the value of Sig. = 0.27 < 0.05.

The result analysis of LSD on the show that the results of the exercises (leg press and shoulder press) and (sitting calf and chest press) turns out to be significantly different.
The resulting average difference values indicate that the practice of leg press and shoulder press has a better effect than on the exercises sitting calf and chest press against the accuracy of hit jumping smash Badminton athlete SAUUnesa. This is evident from the descriptive results above that the provision of training on group I have had greater impact in improving the accuracy of hit jumping smash Badminton athlete SAUUnesa.

DISCUSSION

1. Group I (Workout Leg Press and Shoulder Press)

   Based on the results of the measurements can be seen that there is an increase in the mean value between pretest and posttest on a variable dependent. It is evident that the mean value for the accuracy of the blow jumping smash from the results of measurements of the posttest (28.50), this looks to be higher than the measurement results of pretest (23.40). Those results we can take a summary that in administering treatment in Group I as already described earlier, can improve the accuracy of hit jumping smash.

2. Group II (Exercise Sitting Calf and Chest Press)

   Based on the results of measurements on the Group II can be seen that there is an increase in the mean value between pretest and posttest on a variable dependent. It is evident that the mean value for the accuracy of the blow jumping smash from the results of measurements of the posttest (26.00), this looks to be higher than the measurement results pretest (23: 20). Those results we can take a summary that in administering treatment at Group II as already described earlier, can improve the accuracy of hit jumping smash.
3. Group III (control)

Based on the results of the measurements in table 4.3 above in Group III can be seen that there is an increase in the mean value between pretes and postes on a variable dependent. It is evident that the mean value for the accuracy of the blow jumping smash from the results of measurements of the postes (23.10), this looks to be higher than the measurement results pretes (22.90). Those results we can take a conclusion that in the provision of treatment in the Group III as described earlier, can improve the accuracy of hit jumping smash.

CONCLUSIONS

The research on the influence of exercise arm power and leg muscle power against accuracyhit jumping smash in Badminton UnesaSAU athletes, then it can be summed up as follows:

1. There is significant influence awarding of exercise leg press and shoulder press against the accuracy of hit jumping smash in Badminton athlete SAUUnesa. Test results-t paired t-test values obtained in Sig. $\alpha$ value 0.000 < 0.05. Provision of exercise leg press and shoulder press gave increasing influence on the accuracy of the blow jumping smash with the average delta 5.1.

2. There is significant influence awarding of exercise sitting calf and chest press against the accuracy of hit jumping smash in Badminton athlete SAUUnesa. Test results-t paired t-test values obtained in Sig. 0.003 $\alpha$ value 0.05 <. Training sitting calf and chest press gave increasing influence on the accuracy of the blow jumping smash with the average delta 2.8.
3. There is a significant difference between the results of the training of Group I and group II against the accuracy of hit jumping smash. Anova test result analysis of post hoc stating the value of Sig value $\alpha 0.027 < 0.05$ and mean different to group I of $2.30000$ greater than group II amounted to $2.30000$. So it can be concluded that training leg press and shoulder press has a better effect than on the exercises sitting calf and chest press against the accuracy of hit jumping smash on SAU student Badminton Unesa.
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DEVELOPMENT OF BASIC MOVEMENT LEARNING MODEL INTEGRATED WITH MATH SKILL FOR THE PRIMARY SCHOOL STUDENT GRADE I
Pamuji Sukoco

Abstract

The main objective of the paper is to draft of basic movement learning model integrated with math skill for the primary school student grade 1. The research and development methods aims to test how basic movement learning model integrated with math skill for the primary school student grade 1, which are (1) creating the physical education learning model, particularly basic movement integrated with math skill for the primary student grade 1, and (2) testing the physical education learning model especially basic movement integrated with math skill for the primary student grade 1 in the small scale. The research is multiple-stage process, which stages are an exploration and validation test. The exploration stage refers to development of physical education learning model, particularly basic movement integrated to enhance math skill for the primary student grade 1 and will be validated by the variety of instruments to obtain the purpose of the model. The next stage is a validation test. A validation test is described as doing product test on main subject by using rules of research and development based on Borg and Gall method.

The final goal is to provide guidebooks containing basic movement learning model integrated with math skill for the primary school student that has been validated by academics and also get through trial test in both small and large scales to establish how far the effectivity of the model.

Keywords: Learning, basic movement, math skill

INTRODUCTION

Education is one of efforts recognized to prepare the younger generation so that able in problem solving. To be able to deal with this, education requires some process. However, most people assume that the success of an educational process, usually known as learning achievement criteria, is indicated by good grades in final results. Therefore, parents suggest to their children into private course to add more lessons that relevant with the subject on the final exam.
Moreover, student activities directly focus on the primary subjects in national final exam. Remarkably, despite avowed sometimes insignificance of additional lessons, the demand of private course remain growing up to help well prepared in national exam. In contrast, the other activities such as physical activity, which is not included as the core subjects will be of less interest. Society argued that physical activity is not line with the children’s achievement. Children’s activities such as playing something using physical will be judged as doing useless that impacts on non-competitiveness in academic achievement.

Physical education is a compulsory subject in the basic curriculum. In general, physical education intentions to grow and develop individual optimally. It has significant impact to overall education goals. It can be seen that physical education through well planning has ability to improve fundamental movement integrated with math skill. In this education learning case, some education methods will be designed to advance ability in math skill for the primary school student grade 1. To make simpler, this first step of this study includes the part of two-stage studies plan. It covers two activities: (1) the exploration stage for development of physical education learning model, particularly basic movement integrated to enhance math skill for the primary student grade 1 and will be validated by the variety of instruments to obtain the purpose of the model and (2) a validation test is described as doing product test on main subject by using rules of research and development based on Borg and Gall method.

A. The Essence of Basic Movement Learning

Schmidt (1988: 346) defined motor learning as a set of processes related to the training or experience that leads towards permanent change in skilled behavior. This
definition obviously is known as general concept of synthesis learning involving four aspects.

Piaget cited by Gabbard, LeBlance, and Lowy (1987: 35) stated that the motor activity particularly in playing form could help intellectual development, as stated by Dewey, and Montesory. Furthermore, Zaichkowsky, and Martinekin Gabbard, LeBlance, and Lowy (1987: 36) noted that if a teacher wanted to improve cognitive skills by motion experience, it should be structured to develop perception, to encourage social interaction, and to stimulate cognitive. The lists of motion experiences are:

1) Using game or other motion activities should encourage their ability in problem solving, opportunity of children to look for creativity and logical thinking, and development in sense of attention and memory.

2) The basis of child cognitive development is perception. Motion activity stimulates the body's mechanism perception, it seems to progress body awareness to the environment, space, time, and also strength ability.

3) Participation in exercise programs can improve self-concept. To make it clearly, teachers must know how the characteristics of the child both in physically and emotionally.

4) Improving academic achievement means that strengthen in academic skill.

The statement by Leukel (1968: 364) states that: *If it can be shown that learning changes occur at synapses between nerve cells (whatever parts of brain are involved), what is the nature of synaptic changes? “Molar”changes are discussed first.* Furthermore, Ganong (1999: 106) described that long-term changing in synapses function was a result of synapses impulse history. It implies that synapses can be strengthened or weakened based on the past experience. These changes are very
fascinating for some reasons clearly represent a variety of forms and processes of learning and memory. These changes consist of posttetanic potentiation, habituation, and sensitization.

Learning movement also called motor learning, Schmidt (1998: 346), defines motor learning as “a set of processes associated with practice or experience leading to relatively permanent changes in the capability for responding”. Rusli (1988:122), classifies theory based on psychological study of motion approach and divides it into two main categories: group associations’ stimulus-response theory and gestalt-field theory or cognitive theory. According to Oxendine (1999: 83) there are three important things from the learning activities process that stimuli received. Firstly, to connect one stimulus with the others; secondly, to formulate a moment link between the way(tool) and goals; thirdly, to behave in order to achieve the goal. Learning motion according to this theory, is also defined as a skill sport performed overall in the sport.

According to Schmidt (1998: 479) main concepts of Adams theory are right or wrong references. Response movement that learner has been done will be compared with a specific criteria. Referral mechanism takes place in a closed system and next step is as opened system transfer all the necessary information to begin a movement. The next information based on Adam explanation, quoted by Schmidt (1998: 480), if person carry out the task of the motion, it will result in the intrinsic excitatory feedback. This excitatory leaves a trace in the nervous system called the perceptual trace. Each response produces the longer trail closer to the desired target. Every time learners do exercises or experimental movement, the stronger trace perceptual and less meaning sometimes occurs in errors.
Robb (1992:24) stated that learning theories are classified into three broad categories. These categories are: (1) association, (2) cognitive, and(3) cybernetic. Robb defined association as theorist stress the significance of responses the organism makes and the association or connection of the response to the stimuli. Similar with Robb, Oxendine (1996: 90) expressed the opinion that cybernetic theory based on the concept that information, or feedback received during motion appeared to influences the behaviour change in that specific motion task.

Singer(1980: 1.8), had different statement in learning. He argued that there are three components of motion learning and dynamic operation, named as learners, activities, and situations or environmental conditions which each other will interact to produce behavior change. Learning is as impacts of individual change and always reflects in observable behaviour. As a result of learning change, these are relatively permanent as a consequence of experience or training.

**B. Fundamental of Math Skill**

Guberman, Ainat in the journal *The Development of Children's Counting Ability* stated on cognitive theory, the basics of arithmetic are innateness. Meanwhile, the social-culture is more learned of the child's linguistic and educational environment. The child’s ability to identify the basics of arithmetic have been tested to distinguish between true and false in math. While counting, the children adhere the fundamentals of the subject more than some other basis. Nevertheless, the successful in calculation is influenced by issues of age, social status and economic environment (http://cat.inist.fr.com, 2009).

The purpose of the mathematics in Education Unit Level Curriculum(SBC) or “Kurikulum Tingkat Satuan Pendidikan” (KTSP) in SD/MI suggests that
Mathematics aims to encourage students with the following capabilities: (1) Understanding concepts of mathematics, especially able to describe the relationship between concepts and application of algorithms, (2) using the pattern and way of thinking, (3) Solving the problem, (4) Communicating ideas with symbols, tables, diagrams, or other media, (5) Having respect for the practicality of mathematics in daily life (Ministry of Education and Culture: 2007).

Standard of competence and basic mathematics competencies are organized as a foundation of learning to develop children in math skills. In addition, it is also intended to develop the ability to use mathematics in solving problems and communicating ideas using symbols, tables, diagrams, and other media.

Ministry of Education and Culture (2007) stated that Mathematics have goals for students such as the following capabilities:

1) Understand the concepts of mathematics, describes the relationship between concepts and apply the concepts of algorithms, flexibly, accurately, efficiently, and appropriately, as a problem solving;

2) Use the pattern and nature of reasoning, mathematical manipulation in making generalizations, compile evidence, or explain mathematical ideas and statements;

3) Solve problems that include the ability to understand the problem, devised a mathematical model, solve the model and interpret the obtained solution;

4) Communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem;
5) Have respect for the usefulness of mathematics in daily life, namely to have curiosity, attention, and interest in studying math, and tenacious attitude and confidence in solving problems.

Mathematics in elementary education (SD/MI) include the following aspects: numeral, geometry and measurement, and processing data. Standards of competence and basic competences became the foundation for developing the direction and subject matter, learning activities, and achievement indicators for assessment.

Kahfi (2004: 18) argued that the learning environment based on point of view of the constructivist mathematics include such as:

1) Providing a learning experience that can associate the knowledge already known so that teachers are not the only source of knowledge but also as a facilitator.
2) Providing a variety of alternative learning experience.
3) Interpreting realistic and relevant learning environment involving the concrete experience.
4) Designing interaction and cooperative learning by discussion, such as in a smallgroup-work, group discussion, and frequently asking and answer activities.
5) Using a variety of media to be more effective learning.
6) Involving the emotional and social to interest students have willingness to learn.

Piaget (1950) concluded that every child at the early grade, age of 5-8 years has its own way to interpret and adapt their environment (the theory of cognitive development). Moreover, each students have the cognitive ability of structure s called
schemata, the system concept in mind as a result of an understanding of the existing objects in the environment. An understanding of the object takes place through a process of assimilation (object linking with existing concepts in the mind) and accommodation (the process of utilizing concepts to interpret the object in mind).

Both processes if doing continuously will balance between the old knowledge and new knowledge. In this way, the child can gradually build up knowledge through interaction with its environment. The children’s behaviour is strongly influenced by the aspects of himself and his environment. Both of these may not be separated because the process of learning occurs in the context of child interaction with their environment.

Elementary students are belonging the stage of concrete operations. In the range age, children begin to show learning behavior as follows: (1) start looking at the world objectively, shifting from one aspect to another aspect and observed reflective elements simultaneously, (2) start thinking operationally, (3) use operational thinking to classify objects, (4) establish and utilize connectivity rules, a simple scientific principle, and use the causal relationship, and (5) understand the concept of substance, liquid volume, length, width, area, and weight.

Taking into the development of paradigm stages, the tendency of elementary school children to learn lower class has three characteristics, namely: (1) Concrete, (2) Integrative, (3) Hierarchical. Concrete learning process implies moving from concrete things that can be seen, heard, smelled, touched, and braintinkers, with emphasis on the point of the environment as a learning resource.

Rukki, Santoso (2002: 12) stated that thinking involves subconscious or supra-conscious, thinking in the two sides and the two patterns including the non-verbal
right brain and the left brain is rational. Sometimes, the process of thinking is only considered as something that happens because of rationality, however the process of thought pass along process in getting the knowledge.

In this elementary, children also learn how to gradually develop ranging from simple into more complex things. In this relation, it is necessary to note about the logical sequence, the material linkage, and the width and depth of the material.

Thus, the meaning of math skill in this study is a child's ability to think about mathematics. Learning of mathematics covers the curriculum goals and objectives learning. Curriculum in mathematics consists of several components, including the method and content of the curriculum that expecting children to competent learning. Basic competence in mathematics is a compulsory subject that student absolutely learn in primary school. In spite of a must subject, student should have basic characteristics of low grade. Gabbard, LeBlance, andLowy (1987: 7), Dauer, Pangrazi (1986: 18), suggest some of opinions that can be summarized as follows, physical education has an influence on the development of cognitive abilities. Active children show signs of a deeper areas of language, mathematics, and science. Mechanisms of motor skill learning is a part of the cognitive process. Learning and moving can offer good motivation and encourage willingness to study. Aspects of cognitive development include the concepts of perception and development motoric and there reinforcement of academic concepts. Although the direct effect of physical activity on academic ability has been no strong evidence, indirect implications have been widely shown. Most of the teachers believed that the motor activity plays animportant role in the development of cognitive and perceptual. Through perceptual motor activity, it can be a good influence on the development of cognitive abilities.
According to Gabbard, LeBlance, and Lowy (1987: 6), cognitive development is defined as, “primarily composed of the thought processes, such as problem solving, comprehension, and creativity”. Cognitive ability is described as a thought process such as problem solving, understanding, evaluation, and creativity. While, Monks, Knoers, and Siti Rahayu Haditono (1992: 202), stated that the cognitive is a wide understanding of the thinking and observing, so the behavior that resulted in the gain understanding or understanding needed to use. According to Wuestand Bucher (1995: 40-41), the development of knowledge and understanding is an important goal of physical education and sport. Learning in physical activity involves cognitive processes. Student must learn to analyze their performance, synthesize information, and apply them in new situations.

Based on Piaget’s theory written back by Wadsworth (1984: 9-17), cognitive action is an action and adaptation to environmental organizations. The basic principle of cognitive development is the same as the process of biological development. Both of adaptation process and organization are processes that cannot be seen in isolation. In biological observations, the organization is a part of the adaptation process which are two complementary processes in the mechanism. Organization is the internal aspect of a cycle in which adaptation is an external aspect constituting it. To understand the process of intellectual organization and intellectual adaptation, there are four concepts that need to be understood, namely, schema, assimilation, accommodation, and equilibration. These concept is to explain why and how the mental development occurs.

A schema is a cognitive structure in the process of adapting and organizing the environment. For example, the students make the concept in their mind against an
object such as cows, then making cow scheme has four legs, bigger than a cat, tame animal, and so on.

Assimilation refers to a cognitive process in which individuals integrate perceptual, motoric, or new concepts into the existing scheme or behaviour pattern. The example of this activity is individual observes something new or old longer existing object in his mind-scheme. Next, it will be adjusted between observation result and existing scheme in their paradigm.

Accommodation is known as the opposite process with new stimulus. Individuals can create a new schema to the new stimulus or individuals can modify the new stimulus. Thus, accommodation is described as the creation of a new scheme or modification of the long scheme results.

Equilibration is a balancing process between assimilation and accommodation. This is essential for efficient interaction in environment. Balance is stability condition between assimilation and accommodation. To change condition from unbalance to balance process, equilibrium of the process is needed.

Besides, the cognitive development of Piaget's theory divided that intelligence has three components: content, function, and structure. The contents are what is known of the child's behavior, motor sensory and conceptual observation by reflection of intellectual activities. The function is characteristics of assimilation and accommodation process that is permanent and continous. Meanwhile, the structure is related to the process of structuring and organizing in making the scheme.

Similar with Piaget’s statement, through the sensory exercises, the adaptation process can be carried out, it summarized that motor sensory stimulation impacts on cognitive development to work well. Therefore, the step of growth and development of children
should be given the stimuli in the form of motoric sensory in which they are included in physical activities.

Furthermore, Zaichkowsky, and Martinekin Gabbard, LeBlance, and Lowy (1987: 36) notes that if a teacher wants to improve cognitive skills through experience-motion, it must be specific structured to develop perception, encourage social interaction, and stimulate cognitive.

Research Methods

This research development has several phases. (1) The exploration phase is preparing a model /product obtained from the library research and field studies through the test and questionnaire surveys. The tests were conducted to obtain profile data of the basic motor skills for elementary school students in DIY. This profile is used to develop a draft model further validated with a variety of instruments and to obtain a model that is fit for purpose. (2) Testing/validation phase is to test the product on a subject with small-scale research development according to the rules set by Borgand Gall. As the result is to provide a guide book integrated with math skill for the primary school students grade Itestedin a small scale.

Subjects of Research: grade1of primary school students

In the exploration phase, the collecting of descriptive data is the results of focus group discussion that will be analyzed to get feedback based on the model concepts that has been developed. The first result at this phase is a basic learning model integrated with math skill for primary school grade 1 and their guide instruments.

RESULTS

Gross motor ability test results in calculation, including 50-foot run, jump without prefix, throwing the target ball, control the ball, and balancing about 290 elementary
school students in grade 1 are as follows: average about 250; 247.59 in median, and standard deviation (SD) about 23.8283. Table 1 presents the distribution of gross motor skill for elementary students in DIY.

Table 1. The Frequency Distribution of Gross Motor Skill

<table>
<thead>
<tr>
<th>No</th>
<th>Interval</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X &gt; 285.75</td>
<td>Excellent</td>
<td>20</td>
<td>6.89</td>
</tr>
<tr>
<td>2</td>
<td>261.92 &lt; X ≤ 285.74</td>
<td>Good</td>
<td>80</td>
<td>27.59</td>
</tr>
<tr>
<td>3</td>
<td>238.10 &lt; X ≤ 261.91</td>
<td>Enough</td>
<td>60</td>
<td>20.69</td>
</tr>
<tr>
<td>4</td>
<td>214.26 &lt; X ≤ 238.09</td>
<td>Poor</td>
<td>120</td>
<td>41.38</td>
</tr>
<tr>
<td>5</td>
<td>X ≤ 214.25</td>
<td>Poorest</td>
<td>10</td>
<td>3.45</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>290</td>
<td>100%</td>
</tr>
</tbody>
</table>

Meanwhile, table 2 showed the comparison result in calibration of physical education between experts and teachers. The top score implies have appropriate classification.

Table 2. The Calibration Results between Experts and Teachers in Physical Education

<table>
<thead>
<tr>
<th>Calibration</th>
<th>Classification</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert in “Penas” Learning</td>
<td>4 3 4 3 4 4 4</td>
<td>29/91</td>
</tr>
<tr>
<td>Expert in “Penas” Learning</td>
<td>4 3 4 3 4 4 4</td>
<td>30/94</td>
</tr>
<tr>
<td>Master in Material</td>
<td>4 4 4 3 4 4 4</td>
<td>30/94</td>
</tr>
</tbody>
</table>
### Specification:

1. If symptom or element in the data content is very appropriate classification, it gets four-value (4),
2. If the value declared in accordance so getting three-value (3),
3. If the value declared fit enough, the value of two (2),
4. If the value found not suitable so one-value (1).

The next stage for the first year is completing the draft with math skill. Furthermore, the draft model will be validated by experts and conducted in Focus Group Discussion (FGD). After validating draft model, test in small-scale are tried in all of elementary school in Sleman, DIY.

### CONCLUSIONS AND RECOMMENDATIONS

As a progress result, this research has outcome in development of basic movement learning model integrated with math skill for the primary school student and then will be validated by academics, discuss in FGD, try out in a small-scale testing, and revise this product in this current year (2014).
Reference


EFFECT OF HIGH-INTENSITY INTERVAL TRAINING (HIIT) TO THE IMPROVEMENT OF MAXIMAL OXYGEN UPTAKE (VO$_2$MAX)

(Study at UKM Sport at STKIP PGRI Jombang)

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Abstract: The background of this research is the less of endurance which belongs to the volleyball players. The purpose of this research was to investigate the effect and effective of High-Intensity Interval Training (HIIT) to the improvement of VO$_2$Max. Using the design randomized control group pretest-posttest design. The population of this research is the men-volleyball players of STKIP PGRI Jombang which consists of 39 students. Then, they will be divided into two groups, experimen group which consists of 20 students who are given HITT treatment, and control group which consists of 19 students who are given convensional treatment.

The result of the research can be know that the training design interval training gives the significant result to the improvement of VO$_2$Max. Based on the result of analysis, (1) There is effect of High-Intensity Interval Training (HIIT) to the improvement of VO$_2$Max (Sig. = 0,000 < $\alpha$ = 0,05); (2) High-Intensity Interval Training (HIIT) is more effective than the convensional training to improve VO$_2$Max, because the increase of control group is 2,41%, while the training by using High-Intensity Interval Training (HIIT) VO$_2$Max the athletes’ capability can increase 8,26%.

Key Word: High-Intensity Interval Training (HIIT), VO$_2$Max.

BACKGROUND
Sports achievement basically rely heavily on four (4) major components, namely physical, technical, tactical and mental. Bompa (2009) described some aspects of training: "psychological and mental training, tactical training, technical training, physical training". Volleyball can be described as an exercise intervals on levels of high-intensity intermittent exercise of submaximal effort, utilizing both aerobic and anaerobic energy systems.

Specific physiological capabilities that are needed to perform volleyball skills (Kalinski, Norkowski, Kerner&Tkaczuk, 2002). Modern volleyball players are faster, stronger and in better physical condition than before, that could be the result of a year-round training and skills development that strengthen their power and fitness specific to their sport (Scates & Linn, 2003). Athletes’ physiological capacity is an essential element of success in sports performance. Volleyball is a sport with a high anaerobic and aerobic demands on the lower body because of the need of power to jump and quickly back to the ground that may continue for 20 minutes in the game (Elahe et al, 2013). Volleyball players need to improve their aerobic and anaerobic capacities because they fastly go back and jump in the game that continue for more than 20 minutes (Viltasalo, et.al., 1987).

The endurance is needed on each set in the volleyball match, the physical condition of the athlete tends to decline due to fatigue in the final set. Maximal aerobic power is the major percentage in reaching prime physical condition.

Exercise is known to increase muscle energy status, resulting in the ability to maintain muscle strength for a long time. While both high volume training and high intensity training is an important component of an athlete's training program. Short-term periods of high intensity training is known to improve performance (Laursen
Jenkins, 2002). Sport scientists revealed how a combination of exercise training may work to optimize the development of aerobic muscle phenotype and improve performance with intense exercise. McMilan, et.al. (2005) revealed that a high VO\textsubscript{2}Max values allows the player to cover more distance. Furthermore, Durandt et.al. (2006), explained that the maximal aerobic capacity in a football affect the ability to perform repeated sprints and high intensity both with the ball and without the ball. In this case, a sprint can be applied to a component of movement while doing a smash, when the momentum of rapid motion will be needed. In volleyball VO\textsubscript{2}Max capacity is also needed to support the performance, because the characteristics of the volleyball game requires speed element, jumping approaches may include horizontal movement (jump smash) and movement without approach (setting jumps, block) (Sheppard et. al., 2008). It seems important for the coaches to pay attention to the development and optimization of aerobic capacity in young players.

In this study researchers used interval training. Interval training was chosen for basketball, indoor soccer, football, volleyball, athletics, swimming, and others that contain interval training.

High intensity training (short duration) and low intensity (high volume) training is an important component of the training program for athletes who compete successfully in the event of heavy exercise. In the context of this review, shows that intense exercise is considered as the one that took place between 1 and 8 minutes, where there is adenosine tri phosphate (ATP) energy from both aerobic and anaerobic energy systems (Laursen, 2010). High-intensity"sprint" Generally type exercise training is thought to have less of an effect on oxidative energy provision and endurance capacity. However, many studies have shown that high-intensity interval training(HIIT) –performed with sufficient volume for at least Several weeks –
increases peak oxygen uptake (VO\textsubscript{2peak}) and the maximal activities of mitochondria (Kubukeli et al., 2002; Laursen & Jenkins, 2002; Ross & Leveritt, 2001).

High intensity interval training (HIIT) has become an integral part of training programs for the improvement of athletic performance since the beginning of the 19\textsuperscript{th} century. However, although the core components of the preparation for the competition, the unique effects of training on the performance of trained individuals is rarely done. This is, perhaps, understandable due to some practical reasons. First, sports coaches have found it difficult to convince the elite athletes that can be useful to experiment with their normal training program. Second, even if the athletes (and their coaches) are willing to modify their training practices, conventional approaches to investigate the response to different doses of treatment (i.e., interval training) using a repeated-measures design in which each athlete receives all the different dose really practical to study physical training (Gibala, et al., 2012).

Talanian et al. (2007) showed the effect of exercise training and high intensity interval training increased VO\textsubscript{2Max} from 7\% to 12\%. The research showed increase in VO\textsubscript{2Max} depends on the fitness level of the subject as well as the duration and the increase in the range of 4\%-46\%. The Ancient (2012), in his research showed that high-intensity training and endurance exercise continuously bring significant improvements in body composition, heart rate and aerobic power with less than 2 hours 30 minutes of training weekly. In addition, high intensity training proved to be more effective in improving maximal oxygen capacity.

Andrew et al. (2013) analyzed several research articles and claimed that 3-5 minute interval training is very effective in generating an increase in exercise capacity.
Figure 1 on the weight and density histogram plot effects of the observed interval training on VO\textsubscript{2}Max. Each of the 40 observations were analyzed and weighted by sample size to produce estimates of the percent distribution of subjects by providing a given effect size noted on the Y axis (Andrew, et al, 2013).

Martin et. al., (2012) suggested that high-intensity interval training (HIT) can serve as an effective alternative to traditional endurance-based training, stimulate similar physiological adaptations or even better to those healthy and diseased populations, when compared to the suitable basic training. This research hopefully will increase the endurance of the volleyball players of STKIP PGRI JOMBANG.

**TRAINING**

Exercise is part of a planned physical activity, structured, and repetitive and has as its final destination or the maintenance of physical fitness. Physical fitness is a set of attributes that are either health-related or skill. The extent to which people have
these attributes can be measured with special tests (Caspersen, 1985). Meanwhile, Bompa (1983) stated that the training aims to expand its reach and over all physical development, ensure and improve the development of specific physical, improving and perfecting the techniques, strategies, and quality, ensure and maintain health.

**Training Principles**

Training principles is defined by Whyte (2006) as: “training principles: A number of basic principles which, when appropriately applied, result in optimal adaptation and performance, they include: individuality, reversibility, progression, overload, periodization and specificity”. Meanwhile, fundamental training according to Wilmore (2008: 190): “principle of individuality, principle of specificity, principle of reversibility, principle of progressive overload, principle of hard/easy, principle of periodization”.

According to Fox and Bowers (1981), the basic principles in the training programs are:

a. Knowing the main energy systems are made of to perform an activity.

b. Using loads more in developing training that will develop more specific energy systems. The principle of the load will be increased by increasing the load, sets, reps, frequency and duration of training. The training provided must match the physical fitness level of a person based on the objectives to be achieved.

Astrand & Rodahl (2003) said that to get the training effects, the thing to note is the provision of more load, which gives greater pressure than can be found in everyday activities. Provision of training, the emphasis is associated with catabolic processes, such as the breakdown of fuel molecules, which lead to increased deposition of molecules streamed or distributed during the training process.
Time of training

Sikiru & Okoye (2013), suggested that the administration interval training program conducted for 8 weeks. With intensities ranging from 60% - 79% of the maximum capacity (maximum heart rate) and duration of 45-60 minutes. Haskell, et. al., (2007), recommends aerobic training for ages 18-65 years. For moderate-intensity aerobic exercise, at least 30 minutes with a frequency of 5 times in 1 week, while the intensity of aerobic exercise with heavy intensity minimum duration of time ranging from 20 minutes with a frequency of 3 times a week. In contrast to the results of research Gibala (2007), with six sessions on HIIT training more than two weeks, or a total of only ~ 15 minutes in intense exercise (energy expenditure cumulative ~ 600 kJ or ~ 143 kcal), can increase the oxidative capacity of skeletal muscle and improve performance during a task.

Shephard(2009), analyzed of VO₂ Max with a comparative study senior athletes training in 8-10 weeks, 12-18 weeks and 24-52 weeks. The analysis showed that the 12.9% increase of VO₂ max can be realized within 8-10 weeks of aerobic exercise compared with an increase of 14.1% in 12-18 weeks and 16.9% at 24-52 weeks there were improvements in aerobic systems. Clearly suit personal training fitness professionals can help prevent or even reverse the decline in relations with age and functional independence with progressive aerobic conditioning at the senior population. From a review of the data, Shephard (2009) showed that aerobic training can gradually increase aerobic power at least 10ml/kg/min, potentially delaying the loss of aging for 20 years. Shephard continued that a higher intensity with senior causes greater profits, 5% increase in VO₂ Max (about 6 ml/kg/min) equivalent to about 12 years to regain the passion for one's lifestyle.

Interval training

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“Interval training: the repetition of exercise bouts with defined periods of recovery to develop aerobic endurance capacity. The repetition of intervals allows the athlete to undertake a greater volume of training at the appropriate intensity in a single training session” (Whyte, 2006). Repetition interval allows the athlete to perform a greater volume of training at the right intensity in a single training session.

Interval training generally refers to repeated sessions are relatively brief, intermittent exercise, in which short intervals of intense exercise separated by longer periods of recovery. Depending on the power level, a single effort may last from a few seconds to several minutes, with separate training intervals up to a few minutes of rest or low intensity exercise (Gibala, 2007). Interval training program, involving: "sets, repetitions, training time, training distance, frequency, interval exercise, and passive recovery or active recovery interval" (Wilmore, et. al., 2008).

Wilmore, et.al. (2008) classified the interval training according to the need of event or its activity as follow:

The distance of the exercise interval is determined by the requirements of the event, sport, or activity: short intervals of 30 m to 200 m (33-219 yd), although a 200 m sprinter will frequently run overdistances of 300 to 400 m (328-437 yd). A 1500 m runner may run intervals as short as 200 m to increase speed; but most of his or her training would be at distances of 400 to 1500 m (437-1640 yd). (pp 199)

Interval training with repetition of running program form is a quick method to increase VO₂Max. With interval training methods players can obtain a fit physical condition and excellent endurance. Thus, in the game, athletes do not run out of Oxygen Maximum Volume (VO₂Max) that support their performance during the play.
High Intensity Interval Training

High Intensity Interval Training (HIIT) or high intensity interval training is marked by repeated relatively short session, intermittent exercise, often done with "all out" effort or at an intensity close to what gave rise to the peak oxygen uptake (ie, ≥90% of VO2Max). High intensity exercise has been suggested for aerobic and cardiovascular adaptation gain is greater than the low and medium levels of exercise (Gibala, 2007). High intensity interval training, especially intervals, which usually consists of a reduction of running an "all out", resulting in an increase in muscle oxidative enzymes. i.e., the maximum increase in citrate synthase activity and pyruvate dehydrogenase (PDH) activity. In a relatively short time (ie, 1-2 weeks) (6-8, 18) (Gibala, 2006).

Although there is not any universal definition, HIIT generally refers to repeated intermittent exercise sessions are relatively short, often done with 'all-out' effort or at an intensity close to what gave rise to VO2Max (ie, 90% of VO2 peak). Depending on the intensity of training, a single effort may last from a few seconds to several minutes, with some effort separated by a few minutes of rest or low intensity exercise. In contrast to strength training short intense efforts are usually made to the resistance weight to increase skeletal muscle mass, HIT is usually associated with activities such as cycling or walking and do not cause hypertrophy (Gibala, 2007).

High intensity interval training (HIIT) has been shown to improve performance in a relatively short training period (Sperlich, 2010). Ancient (2012), showed that high-intensity training and endurance exercise continuously bring significant improvements in body composition, aerobic power and heart rate to less than 2 hours
30 min training weekly. In addition, high intensity training proved to be more effective in improving oxygen maximal capacity.

The training of High Intensity Interval Training (HIIT), the form of training sessions alternate between short repeated in intense exercise and active rest periods, improving several clinically relevant outcomes. In particular, in healthy and clinical populations, HIIT increase VO2max, exercise performance, cardiovascular function, and markers of oxidative capacity in skeletal muscle. HIIT has also recently been reported to reduce systemic inflammation in patients with coronary intervention. And individuals with metabolic syndrome. The physiological benefits can be achieved in a short time and with little total energy expended during exercise (ie training volume) of training endurance training, however, some evidence suggests it is more pleasant than ET, HIIT is usually closely related to the maximum intensity or supramaximal intensity. This intensity is a potential threat to be adopted by the general public. Security protocols for training with higher intensity (ie, supramaximal intervals) for populations with risk of cardiovascular disease (Boy, et.al.,2013).

Maximum Volume of Oxygen Capacity (VO₂Max)

Maximal aerobic power as a measure of aerobic capacity has been established as the international standard of physical capacity. Maximal oxygen capacity is defined as the maximum amount of oxygen that the organism consumes per unit of time while the exercise intensity grows, and that can not be improved with further increase in exercise intensity (Ranković, et.al., 2010).

Silva et. al.(2008) stated that aerobic capacity (VO₂Max) is a metabolic parameters intended to measure individual maximal oxygen uptake, and this is an important performance indicator. The term maximal aerobic capacity equal to the
maximal oxygen uptake, maximal aerobic power or maximal oxygen consumption or VO₂Max.

Uliyandari (2009) said that VO₂ Max is the maximum amount of oxygen that can be consumed during intense physical activity until exhaustion occurred. Because VO₂Max can limit a person's cardiovascular capacity, VO₂Max is considered as the best indicator of aerobic endurance. Maximal oxygen uptake (VO₂Max) is the body’s capacity to transport and use oxygen during a maximal exertion involving dynamic contraction of large muscle groups, such as during running or cycling. Also known as maximal aerobic power and cardiorespiratory endurance capacity (Larsen, 2010).

Guyton & Hall (2008) said that VO₂ Max is the oxygen consumption rate in maximum aerobic metabolism. Maximal aerobic capacity can also be used as an indicator of a person's physical fitness. Furthermore, VO₂Max can also be interpreted as a maximum of one's ability to consume oxygen during physical activity.

Shephard (2009), defined VO₂Max or Maximal oxygen consumption (also called maximal oxygen uptake, maximal aerobic power, aerobic capacity, functional aerobic capacity, or simply VO₂max) is considered as a measure of cardiorespiratory fitness criterion. This is the highest level at which oxygen can be consumed during exercise or the maximum rate at which oxygen can be taken in, distributed, and used by the body during physical activity. "V" in VO₂max is the volume used per minute (appears above the V to indicate "per unit time"). VO₂max is usually expressed in relative (uptake relative to body weight) this as a measure of milliliters of oxygen consumed per kilogram of body weight per minute (ml O₂ / kg / min or ml / kg / min). Important factors that affect maximal oxygen consumption in healthy adults is age, sex, heredity, body composition, and mode of exercise training situation. In addition, a number of diseases such as heart disease, chronic obstructive pulmonary disease,
diabetes, and cancer-related bone diseases (such as osteoporosis) can markedly interfere with maximal aerobic capacity.

Uliyandari (2009) described that some of the factors that can affect the value of VO2max were age, sex, temperature, and condition training. To determine the increase in endurance capacity in athletes before and after training can be measured through Volume Oxygen Maximum (VO2Max).

**Type and Research Design**

This research is an experimental research, the research design used a randomized control group pretest-posttest design (Maksum, 2012). The population in this study were students of sport and education of STKIP PGRI Jombang who follow volleyball group totaling 39 people, with an average age of 19 years. The process of division of members of the population into two groups by random sampling is done. Each group was given the symbol to facilitate the process of division of the group. Giving symbols are as follows:

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>VO2Max</td>
<td></td>
</tr>
<tr>
<td>High Intensity Interval Training</td>
<td>20</td>
</tr>
<tr>
<td>Conventional training</td>
<td>19</td>
</tr>
</tbody>
</table>

The sample of this research are the volleyball group of STKIP PGRI Jombang, and the research was conducted for 10 weeks with one week held a consolidated
details and preparation initial tests, eight weeks for treatment, and the end of the week for the final tests and preparation of research reports. The schedule of the data collection process is described in the table below:

**Result and discussion of the research**

Statistics summary (descriptive) of the VO₂Max test results are presented in Table 2 below, the results are VO₂Max increased in both groups, but the treatment group (HIIT method) experienced greater improvement compared with the control group (conventional training).

**Table 2. The data description of group research**

<table>
<thead>
<tr>
<th>No.</th>
<th>Group</th>
<th>Keterangan Deskripsi</th>
<th>Vo₂max Pre-Test</th>
<th>Vo₂max Post-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control (conventional training)</td>
<td>Rate 36,51</td>
<td>37,38</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 37,90</td>
<td>38,70</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Min 34,90</td>
<td>35,50</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deviation Standart 0,76</td>
<td>0,77</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>% Increasing 2,41%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Training by using HIIT</td>
<td>Rate 36,32</td>
<td>39,32</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 38,70</td>
<td>42,40</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Min 33,40</td>
<td>36,40</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deviation Standart 1,26</td>
<td>1,37</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>% Increasing 8,26%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To find the difference between the experimental group and the control group, data analysis is used independent sample t-test (variance equality test using Levene's test, p > 0.05 in all cases). Overall results of the posttest showed significant differences between the experimental group and the control group \([t = 5.396; p = 0.000(<0.05)]\). While the results of the pretest showed no significant difference between the experimental group and the control group \([t = -0.553; p = 0.584(>0.05)]\), it showed that initial ability between the two groups was the same.

**Table 3. Independent Sample t-test**

<table>
<thead>
<tr>
<th></th>
<th>experimental–Group</th>
<th>T</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Oxygen Capacity (VO(_2)Max)</td>
<td>Pretest</td>
<td>-0.553</td>
<td>0.584</td>
</tr>
<tr>
<td></td>
<td>Postest</td>
<td>5.396</td>
<td>0.000</td>
</tr>
</tbody>
</table>

In Table 4, statistical differences for the data pretest and posttest for the experimental group were analyzed using paired samples t-test for the total score of the maximum oxygen capacity (VO\(_2\)Max); the results showed significant difference in maximal oxygen capacity (VO\(_2\)Max) before and after treatment using the method of HIIT training \([t = 13.932; p = 0.000(<0.05)]\), with an increase of 8.26%.

**Table 4. Paired Sample t-test**

<table>
<thead>
<tr>
<th></th>
<th>Eksp - Kontrol Grup</th>
<th>T</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Oxygen Capacity (VO(_2)Max)</td>
<td>Postest</td>
<td>13.932</td>
<td>0.000</td>
</tr>
</tbody>
</table>

This study used 39 subjects which were divided into 20 subjects of experimental group and the control group with 19 subjects. From the results of research conducted
by administering treatment of High Intensity Interval Training (HIIT) and the conventional group. With the imposition of 60% -79% of the maximum capacity (maximum heart rate) and duration of 45-60 minutes, the sample with a 400-meter jogging 3x replicates, the ratio of 1:1, and passive recovery, which will be again divided into three groups, namely group with high ability, medium, and low. The duration of the training program was 8 weeks and the frequency of training was 3 times a week. The research results were as follows:

1. Effect of Training program of High Intensity Interval Training (HIIT) toward increasing VO₂Max

The training group of High Intensity Interval Training (HIIT) increased their capacity of VO₂Max, with the percentage of increase in VO₂Max 8.26%.

2. Effect of Training program of conventional toward increasing of VO₂Max

Conventional training group (control group) increased only 0.87ml/kg/min, or in other words the percentage increase in VO₂Max in this relatively small, 2.41%.

The results of this study are a result of the manifestation of the principles of training which are applied in a specialized training program in order to increase VO₂Max in men's volleyball players, and in accordance with the meaning of it's own training goals is to establish, improve and maintain the condition of biomotor, abilities, physiological, psychological and motor skills in techniques and tactics based on the defined phases. The results of this study demonstrate the relevance of the training program implemented.

This study suggests there is a significant increase in VO₂Max in the experimental group. The results of the study Ancient (2012), showed that high-
intensity training and endurance exercise continuously bring significant improvements in body composition, aerobic power and heart rate to less than 2 hours 30 min training weekly. In addition, high intensity training proved to be more effective in improving maximal oxygen capacity.

From the results obtained and the previous research showing an increase in VO$_2$Max as a result of the provision of training programs intensity High Interval Training (HIIT) which is applied to the training principles and adapted to the needs of athletes. It can be concluded that in order to improve VO$_2$Max in volleyball athletes, athletes can be given interval training program especially High intensity models Interval Training (HIIT).

**Conclusion**

In line with the result and research discussion which has been discussed previously, it can be concluded as follow:

1. There is a significant increase in VO$_2$Max in men's volleyball players who trained HIIT.
2. There is not a significant increase in VO2max in those who trained conventionally.
3. Treatment program, the High Intensity Interval Training (HIIT) is more effective in improving VO$_2$Max.

**Suggestion**

1. To improve athletes’ VO$_2$Max, especially volleyball can not only done by Continuous Training & fartlek alone, but also with High intensity Interval Training (HIIT).
2. The model of High Intensity Interval Training (HIIT) can be recommended and applied to training programs in order to increase athletes’ ability of maximal aerobic capacity in athletes.

References


Sikiru, L., Okoye, G.C. 2013. *Effect of interval training programme on pulse pressure in the management of hypertension: a randomized controlled trial.* Department of Medical Rehabilitation. Faculty of Health Science and Technology, University of Nigeria, Enugu Campus, Enugu, Nigeria. 13(3): 571 – 578


Development of Instruments Shooting Test In Speed Spot Shooting Test In Basketball

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ABSTRACT

Shooting test instrument is very important to measure the technical skills in the sport of basketball shooting. It is known that the shooting is a very important skill in the sport of basketball to achieve victory in a match. Test instrument was developed from instruments shooting speed spot shooting test, which aims to create a test instrument of shooting more productive, effective, and efficient according to the needs and functions within a game and qualify the validity and reliability for measuring test shooting in basketball sport. Shooting test instrument development aims to develop a new product or enhance existing products, in order to get better and has a value of test validity and reliability tests, in accordance with the shooting of components required in an actual basketball game.

Keywords: Development of instrument test, speed spot shooting test.

A. INTRODUCTION

Basketball game is a game that is fast, dynamic, exciting and amazing. change numbers every minute makes this game interesting. Thanks to these features, the game basketball has become one of the most popular game in the world and into the game in the modern era. According Rodacki et al. (2005: 231) mentions "Basketball is a highly dynamic sport, in which players must perform Several shots from distances from basketball." From the word is explained that the basketball game is a very dynamic sport, in which players have to make a shot from a distance of several to the basket.

The success of a team in a basketball game is always determined by the success of the shoot. Shooting is targeting the end of each play, also including the decisive element of
victory in a game because victory is determined by the number of balls into the basket, every attack is always trying to be able to make shots (Horongbala, R., Solomon, I., Arifin, M., 2005 : 24). So every athlete basketball is very important to master the techniques of shooting, because shooting is a very important skill in the sport of basketball in order to achieve victory in a match (Wissel, H., 1996: 43).

It is known that in a basketball game every game location or position in the shooting is an opportunity and a major key to get the value, then for the success of a team must have players who are able to make shots. Based on the observation and analysis of NBL basketball game (National Basketball League) Indonesia to obtain statistical data, such as video games and basketball NBL (National Basketball League) Year 2011-2012 in Indonesia. The statistical data contained in the form of data location of the position players during a shooting committed by basketball players during the game against the location of the shooting positions on existing skills test. It can be concluded that the test instrument in a basketball shooting skills are there, are less likely to lead to form an actual game or match. Shooting skills test instruments so that there is less productive, effective and efficient in the test shooting skills and yet have test instruments that are valid, reliable, objective and has norm.

Instrument testing plays an important role in determining the quality of a study, because the validity of the data obtained will be largely determined by the quality or validity of the test instrument used. Instrument function tests revealed the facts into the data, so that if the test instruments used have adequate quality in terms of valid and reliable, the data obtained will be in accordance with the actual facts or circumstances on the ground. Meanwhile, if the quality of testing instruments that are used are not good in the sense of having low validity and reliability, the data obtained is not valid or does not match the facts on the ground, which can lead to erroneous conclusions.

From the analysis of the needs of shooting in basketball games, related to the issue of the existence of the instrument test shooting skills in a basketball game that is not in accordance with the needs of basketball athletes in the actual game. the measurement test instrument skills such techniques need to be developed to conduct development research aimed at finding and developing a new product and the existing ones in order to improve and development so as to produce a new shooting skills test instrument that can represent the entire test shooting is used and needed in basketball game.
B. METHODS

1. Research

This type of research used in this study is the development of research. Development research is a study that aims to develop a new product or enhance existing product (infallible, 2008: 19). Development research is a study that aims to develop a new product or enhance existing products, which can be accounted for (Sukamadinata, 2006: 164).

2. Subjects Research

Subjects in this study was a basketball player son Jaguars Basketball Club. This meant that the subjects used in this study is really in the best conditions in terms of the basic techniques of basketball games. The subjects used in this study were 30 for the first test, 40 for the second test, and 50 for the third test (determines the norm or standard scores).

3. Research Procedure

Research procedures that will be implemented in this research is divided into several stages, among other things:

a. The first stage:

Analyzing the technique of shooting in the basketball game. At this stage the shooting data collection done by looking at videotape NBL (National Basketball League) Indonesian and calculations manually analyze the shooting in the game by analyzing the statistical data of the NBL Indonesia in the form of "Short Box Score and Chart", NBL basketball game Indonesia in 2011-2012. The analysis shows that shooting is done from the whole team NBL Indonesia in the shooting percentage in the results and can shoot 1 point in doing that work done as much as 5839 times shooting and shooting is done to produce as much as 3599 times the points. So dipersentasekan obtained at 61.64%, and the percentage of results that can be in shooting is 2 points, namely the work done as much as 15 654 times shooting and shooting is done to produce as much as 5998 times the points. Dipersentasekan thus obtained was 38.32% and the percentage in the results and can in 3-point shooting is that the work done as much as 5928 times shooting and shooting is done to produce as much as 1518 times the points. Dipersentasekan thus obtained was 25.61%.
b. *The second stage: Collect and evaluate existing tests.*

After analyzing the match, the next step is to record and evaluate existing tests. There are several shooting test: a test instrument used to measure the technical skills in the sport of basketball shooting, namely: Test Shoot According to Johnson and AAHPERD, Test Shoot According Lehten and STO, AAHPER Basketball Skill Test, Young-Moser Basketball Skill Ability Test, Wisconsin Basketball Skill Test, Speed shooting spot test.

It is known that the shooting skills test instrument that is not in accordance with the needs of athletes basketball shooting skills test instrument because there are less leads to form the actual game or match. Shooting skills test instruments so that there is less productive, effective and efficient in the test shooting skills. So that from the analysis of the test and needs shooting in the basketball game at the top, then test and measurement engineering skills that need to be developed using a test instrument that fits your needs shooting in the game, so as to produce a new shooting test that can represent the whole shooting tests used and needed in the basketball game speed shooting spot test in (Baumgartner & Jackson, 1995: 349). Speed spot shooting test will be developed according to the needs of the shooting in the game, adding a test execution instructions, add an item or type of shooting and assessment scores obtained and modify the target range shooting.

c. *The third stage: Designing shooting technique test development discussions and expert coaches.*

The third stage is to design test development skills shooting techniques that can describe the types of skills used and shooting techniques needed in the basketball game. The design of the test development technique of shooting is done in the discussion of experts and trainers. Experts and trainers involved in the design development of a test of shooting skills this technique is a basketball coach who is certified by a licensed trainer and expert minimal or faculty basketball. The experts and coaches include:

1. Eddy Santoso (Headcoach Pacific Caesar Surabaya)
2. Drs. Sudarso, M.Pd. (Lecturers and trainers Basketball Coaches)
3. Sapto Wahyu Purnomo (Expert Basketball)

In this shooting test development technique used type of shooting is used and needed in a basketball game in accordance with the statistical analysis of the NBL Indonesia in the form of "Short Box Score and Chart", Indonesian NBL basketball game in 2011-2012 is
shooting 1 point, 2 points shooting and 3-point shooting. Based on the results obtained expert
discussion 6 (six) different design for the development.

d. The fourth stage: The first trial.

After getting the kinds of skills that is predominantly used in the shooting games and
developing shooting test instruments, then the next step is to test the test instrument. In this
case the test is tested shooting test development that has been selected and composed by the
researcher based on the study of the theory are obtained and input of trainers and experts in
focused discussions.

In the first test subject of the research is 30 players, and the research subject retrieval
techniques using purposive sampling technique is a sampling technique which traits or
characteristics are known in advance based on the characteristics or nature of the population
(infallible, 2008: 43). The steps of this trial was planned implementation is done is 1
Socializing shooting test instrument implementation guidelines that have been developed and
will be implemented, 2 Carry out tests on test instruments that have been developed in the
shooting, 3 Record all the results of the implementation of the first test, 4 Analyze and
interpret the data. In the test phase is intended to choose the kind of shooting test instrument
that has the best value that can measure the validity of shooting ability which test instruments
selected shooting is done in a shooting match. To clarify the first experiment in this research.

e. The fifth stage: Data analysis and expert discussion.

At this stage of the analysis of data to look for the type of shooting that has a validity
test best of field trials first and then focus the discussion of experts to revise or repair if there
are deficiencies in the shooting tests selected from the first trial.

f. The sixth stage: The second trial.

After analyzing the data and get the kind of good shooting test or type of test shooting
has been getting elected when the first trial. In the second trial conducted 2 (two) times of
testing, the first test the Jaguars Basketball Club players and testing of both the club
professional athletes, who tested the test is just the kind of test shooting good or elected
according to the analysis of the data in the first trial that will be tested on this second trial.

The steps in the first test is the same as in the first trial, the second trial is the subject
of the research are being used more than the first test, which amounts to 40 basketball players.
While on this second test as many as 40 athletes selected to test shooting of the first test and
the results will be correlated with the ability to play professional basketball athletes that players Pacific Caesar Surabaya. To play capability assessment given by experts or expert and coach of the club.

g. *Stage seven: Test Validation.*

At this stage is the last stage of data collection. The objectives in this stage is to look for value validation and test criteria based on existing measurements, which include test validity, and reliability. At this stage the determination of research subjects using the same technique as in the second test phase. Subjects used in this phase of approximately 40 players.

h. *Stage eight: Composed shooting test instrument valid and reliable.*

At this stage aims to convert the results to be achieved in the player doing the shooting test instrument. These results can be further categorized into groups of players shooting ability a) very good, b) good, c) are, d) less, e) is very less. To prepare the standard scoring measures according to Abdul Gani (1987) in Widodo (2007: 76) as follows: Looking for a different or the difference between the highest and lowest scores, Determining the interval, Determining average scores, standard scores Determining, conversion or transformation of raw scores to in standard scores using the mean, standard deviation and a constant.

4. **Data Analysis Techniques.**

In this study the type of data that is obtained or collected quantitative data in the form of scores of each individual shooting ability. This data was obtained from the implementation of the results of the data collection instrument developed tests. Furthermore, this data is raw data or row input various data analysis are needed. The data analysis of this research is descriptive statistical, normality test using the "Kolmogorov-Smirnov", test validity, reliability testing and preparation of the norm.

To analyze the validity of the test interval scale data in this study, each shooting tests were processed using correlation test "product moment" of Pearson (Arikunto, 2006: 170) to determine the test items selected by finding the value of the correlation coefficient \(r\) between items tests and items that have the highest correlation value is selected item. For each reliability test shooting processed using the "Alpha Cronbach's" aims to find such tests provide a steady and consistent results when used repeatedly will get the same results.
Preparation of structured norm aims to classify the results of tests that have been performed by the subjects in the study. In the preparation of the norm based on the shooting ability of each individual who subsequently converted into scores. Meanwhile, researchers in computation analysis using SPSS computer assistance 16:00 for Windows and Microsoft Office Excel 2007.

C. RESULTS AND DISCUSSION RESEARCH

1. Discussion of Results Discussion of Experts

Discussion experts resulted in some changes and improvements in this research. Changes in the type of test and repair Spot Shooting Speed Test is structured as follows:

a. In the first draft that is shooting a one-two-three specified positions (A1) used are:

Shooting 1 point is at the position at the free throw shooting (free throws), shooting 2 points, namely at the position in the line shooting three-pointers (in accordance with the test instrument), 3-point shooting is the shooting position outside the three-point shot line (accordance with the test instrument) by shooting at the specified position.

b. In the second draft is shooting a one-two-three free positions (A2) used are:

Shooting 1 point is at the position at the free throw shooting (free throws), shooting 2 points, namely at the position in the line shooting three-pointers (in accordance with the test instrument), 3-point shooting is the shooting position outside the three-point shot line (accordance with the test instrument) by shooting at the specified position.

c. In the third draft is shooting a one-two-three specified positions (B1) used are:

Shooting 1 point is at the position at the free throw shooting (free throws) and shooting failed touching a basketball hoop, shooting 2 points, namely at the position in the line shooting three-pointers (in accordance with the test instrument) and do a lay-up work, shooting 3 points, ie at a position outside the line shooting three-point shots (in accordance with the test instrument) by shooting at the specified position. Equipment used is basketball, ribbon marker (position / location of the athletes do the shooting), the stopwatch.

d. In the fourth draft is shooting a one-two-three free positions (B2) used are:

Shooting 1 point is at the position at the free throw shooting (free throws) and shooting failed touching a basketball hoop, shooting 2 points, namely at the position in the line shooting three-pointers (in accordance with the test instrument) and do a lay-up work,
shooting 3 points, ie at a position outside the line shooting three-point shots (in accordance with the test instrument) by shooting at the specified position. Equipment used is basketball, ribbon marker (position / location of the athletes do the shooting), the stopwatch.

e. In the fifth draft shooting one-two-three specified positions (C1) used are:

Shooting 1 point is at the position at the free throw shooting (free throws), shooting 2 points, namely at the position in the line shooting three-pointers (in accordance with the test instrument) and do a lay-up work, shooting 3-point shooting is at a position outside three-point shot line (according to the test instrument) by shooting at the specified position. Equipment used is basketball, ribbon marker (position / location of the athletes do the shooting), the stopwatch.

f. In six of the draft to shooting one-two-three free positions (C2) used are:

Shooting 1 point is at the position at the free throw shooting (free throws), shooting 2 points, namely at the position in the line shooting three-pointers (in accordance with the test instrument) and do a lay-up work, shooting 3-point shooting is at a position outside three-point shot line (according to the test instrument) by shooting at the specified position. Equipment used is basketball, ribbon marker (position / location of the athletes do the shooting), the stopwatch.

2. Results of First Trial

In the first experiment the number of tests that tested as many as six (6) types of tests (variable). In this first experiment tested all data for normality of data using Kolmogorov Smirnov test of normality (KS). The data requirements of the Kolmogorov Smirnov normality test (KS) is called normal if the probability or $P> 0.05$. Therefore the probability or $p$ value of all sample data from the research variables greater than 0.05, it can be said that all of the data sample of 30 people from the research variables of normal distribution.

Having in mind all of the data are normally distributed, then the continued validity test using a simple statistical test correlation (bivariate correlation) of Pearson (Pearson Product Moment). Standard acceptable correlation coefficient in the minimal validity test is 0.70 and the coefficient of the following types of tests were "questionable" and needs to be corrected or revised. So thus shooting the kinds of tests that can be used to measure the ability of shooting is as follows:
a. The first draft of A1 \((r = 0.943)\), and A2 \((r = 0.870)\) is a type of test that can be used to measure the skills of shooting in basketball.

b. The design of both B1 \((r = 0.871)\), and B2 \((r = 0.924)\) is a type of test that can be used to measure the skills of shooting in basketball.

c. The third draft C1 \((r = 0.924)\), and C2 \((r = 0.892)\) is a type of test that can be used to measure the skills of shooting in basketball.

**Table 1: Classification results of validity test test shooting first**

<table>
<thead>
<tr>
<th>No</th>
<th>Types of Shooting Test</th>
<th>Validity Value</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shooting one-two-three specified positions (A1)</td>
<td>0.943</td>
<td>Special</td>
</tr>
<tr>
<td>2</td>
<td>Shooting one-two-three free positions (A2)</td>
<td>0.870</td>
<td>Special</td>
</tr>
<tr>
<td>3</td>
<td>Shooting one-two-three specified positions (B1)</td>
<td>0.871</td>
<td>Special</td>
</tr>
<tr>
<td>4</td>
<td>Shooting one-two-three free positions (B2)</td>
<td>0.924</td>
<td>Special</td>
</tr>
<tr>
<td>5</td>
<td>Shooting one-two-three specified positions (C1)</td>
<td>0.924</td>
<td>Special</td>
</tr>
<tr>
<td>6</td>
<td>Shooting one-two-three free positions (C2)</td>
<td>0.892</td>
<td>Special</td>
</tr>
</tbody>
</table>

3. Results of the Second Test

In the second trial was conducted 2 (two) times of testing, namely 1) The first test using a sample of children Jaguars Basketball Club, 2) a second test using a sample of professional players from the club in Surabaya. Test shooting was elected tested on professional athletes linked to the extent of shooting tests chosen to correlate with the ability to play basketball at professional athletes. The higher the correlation, the higher the validity of a test (Maksum, 2009: 58).

In the second trial the number of the types of tests that tested as many as three types of tests (variable). Three types of test is a test that is selected in the first trial that has high validity, namely Shooting one-two-three specified positions (A1) with a value of \(r = 0.943\), Shooting one-two-three free positions (B2) with the value of \(r = 0.924\), and Shooting one-two-three specified positions (C1) with a value of \(r = 0.924\).
In this second trial all data were tested for normality of data using Kolmogorov Smirnov test of normality (KS). The data requirements of the Kolmogorov Smirnov normality test (KS) is called normal if the probability or $P > 0.05$. Therefore the probability or $p$ value of all sample data from the research variables greater than 0.05, it can be said that all of the data sample of 40 people from the research variables of normal distribution.

Having in mind all of the data are normally distributed, then the continued validity test using a simple statistical test correlation (bivariate correlation) of Pearson (Pearson Product Moment). Standard acceptable correlation coefficient in the minimal validity test is 0.70 and the coefficient of the following types of tests were "questionable" and needs to be corrected or revised. The results of testing the validity of the second trial the first test can be seen in Table 2 below.

Table 2 Classification Validity Test Results

<table>
<thead>
<tr>
<th>No</th>
<th>Types of Shooting Test</th>
<th>Validity Value</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shooting one-two-three specified positions (A1)</td>
<td>0.976</td>
<td>Special</td>
</tr>
<tr>
<td>2</td>
<td>Shooting one-two-three free positions (B2)</td>
<td>0.974</td>
<td>Special</td>
</tr>
<tr>
<td>3</td>
<td>Shooting one-two-three specified positions (C1)</td>
<td>0.974</td>
<td>Special</td>
</tr>
</tbody>
</table>

Having obtained the shooting test selected from the first second trial testing the extent of continued search for the selected shooting tests correlated with the ability to play professional athlete Pacific Caesar Surabaya is assessed by experts or expert and coach of the club. The scoring on the ability of the athletes to play using a scale of 1 - 100 For more details, refer to table 3 the results of the correlation test for the second trial on the second test.
Table 3 Classification Table Validity Test results

In the Second Test Testing II

<table>
<thead>
<tr>
<th>No</th>
<th>Types of Shooting Test</th>
<th>Validity Value</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shooting one-two-three specified positions (A1)</td>
<td>0.922</td>
<td>Special</td>
</tr>
<tr>
<td>2</td>
<td>Shooting one-two-three free positions (B2)</td>
<td>0.857</td>
<td>Special</td>
</tr>
<tr>
<td>3</td>
<td>Shooting one-two-three specified positions (C1)</td>
<td>0.879</td>
<td>Special</td>
</tr>
</tbody>
</table>

With the results of the shooting tests concluded that elected to have a special classification, and selected shooting tests can be used to measure the ability of the player shooting the basketball. Having obtained the validity of the second trial, then the next step is to test reliability. To test reliability in this study using Cronbach's Alpha. So the results of the two measurements are correlated, and the calculation of the correlation test is called the value of the reliability test. The calculation results of statistical tests and classification Cronbach's Alpha reliability test can be seen in Table 4 below:

Table 4 Classification of Test Reliability Test Results Calculation Shooting

Second Trial

<table>
<thead>
<tr>
<th>No</th>
<th>Types of Shooting Test</th>
<th>Reliability Value</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shooting one-two-three specified positions (A1)</td>
<td>0.928</td>
<td>Special</td>
</tr>
<tr>
<td>2</td>
<td>Shooting one-two-three free positions (B2)</td>
<td>0.876</td>
<td>Height</td>
</tr>
</tbody>
</table>

1. Third Test Results

In the third trial was conducted to develop the manufacture of measurement norm. Norma measurements needed to create a category of a group of data. Under certain norms, we can separate the data into various categories according to our interests. In the preparation of this norm used method scale, and the scale used to determine the status of the scale five
shooting ability, because the categories to be obtained there are five categories, namely: 1) Very good, 2) good, 3) Sufficiently, 4) Less, 5) Less than once.

To determine the ability of the criteria in the basketball shooting technique used a standard scale of five (stafive). When depicted in the form of a symmetric curve is as follows:

![Figure 1 Curva Five Standard Scale (Sudijono 2011: 329)](image)

The results of the standard five-point scale (stafive):

Mean + 1.5 SD = 16.84 + 1.5 x 2.296 = 20.28844 rounded to 20

Mean + 0.5 SD = 16.84 + 0.5 x 2.296 = 17.99244 rounded to 18

Mean - 0.5 SD = 16.84 to 0.5 x 2.296 = 15.69644 rounded to 16

Mean - 1.5 SD = 16.84 to 1.5 x 2.296 = 13.40044 rounded to 13

Having obtained the value of the calculation result of the standard five-point scale (stafive) then the next step is to develop a standard score. The following table shows the value of 5 is the highest and the lowest scores on norm Development Speed Shooting Spot Test.
Table 5 Scores Norma Shooting Spot Speed Test Development

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Score Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than Once &lt;13</td>
<td>0-12</td>
<td>Less than Once</td>
</tr>
<tr>
<td>Less ≤13 &lt;16</td>
<td>13-15</td>
<td>Less</td>
</tr>
<tr>
<td>Medium ≤16 &lt;18</td>
<td>16-17</td>
<td>Medium</td>
</tr>
<tr>
<td>Neither ≤18 &lt;20</td>
<td>18-19</td>
<td>Well</td>
</tr>
<tr>
<td>20 ≤ Very Good</td>
<td>20 and above</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Table 6 Category Test Shooting One-Two-Three Specified Positions

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Score Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than Once &lt;13</td>
<td>0-12</td>
<td>Less than Once</td>
</tr>
<tr>
<td>Less ≤13 &lt;16</td>
<td>13-15</td>
<td>Less</td>
</tr>
<tr>
<td>Medium ≤16 &lt;18</td>
<td>16-17</td>
<td>Medium</td>
</tr>
<tr>
<td>Neither ≤18 &lt;20</td>
<td>18-19</td>
<td>Well</td>
</tr>
<tr>
<td>20 ≤ Very Good</td>
<td>20 and above</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

E. CONCLUSION

From the results of the analysis conducted in Chapter IV conclusion that can be drawn to answer the problem formulation as follows:

a. The selected test type is shooting a one-two-three specified positions (A1) has a value of validity \((r = 0.976)\), which includes a special classification, and has a value of reliability \((r = 0.928)\) that includes a special classification. A1 shooting test the validity of significant value, so it can be used to measure the ability of the player shooting the basketball. A1 shooting tests can thus be said that the shooting test A1 proved reliable, so it can be used to measure the ability of the player shooting the basketball.

b. Criteria abilities in basketball shooting technique that is obtained from the calculation using the standard five-point scale (stanfive) to develop norms measurements on test shooting shooting one-two-three positons as follows:
F. REFERENCES


Maksum, A. 2012 Research Methods in Sport. Surabaya: Faculty of Sport Science UNESA.


APPLYING CONCENTRATED SOLUTION OF PALM SUGAR + 5% NaCl
PRIOR TO EXERCISING AND ITS EFFECTS ON AEROBIC ENDURANCE

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Abstract: This study aimed to determine the effect of applying palm sugar+5% NaCl solution prior to exercising on aerobic endurance. The study was conducted to 60 2011/2012 students of Penjaskes-Rek at FKIP of Halu Oleo University. The sample were determined through simple random sampling technique. The study used a true experimental design with randomized pre-test-post-test control group design. The instrument of the research was Multi Stage Test.

The results of the study shown that the application of 80% palm sugar + 5% NaCl solution 30 minutes prior to exercising can significantly improve aerobic endurance both in the first, second, and third attempt, as was indicated by the value of $F_{count} = 5.54$ with a probability value of $(p) = 0.001 < \alpha 0.05$. Likewise, the experimental group consuming a solution of 80% palm sugar 30 minutes prior to exercising experienced a more significant improvement in aerobic endurance than did the experimental group both in the first, second, and third attempt, in which the $F_{count} = 6.72$ with a probability value of $(p) = 0.001 < \alpha 0.05$. There was no significant difference in the effects of applying 80% palm sugar on the aerobic endurance of the group receiving 80% palm sugar +5% NaCl, both in the first, second, and third attempt, in which $F_{count} = 1.36$ with a probability value of $(p) =0.245 > \alpha = 0.05$.

Keywords: solution of 80% palm sugar + 5% NaCl, prior to exercising, aerobic endurance.

Nutrition is an important variable that determines a sportsman’s performance. Sufficient nutrition in an athlete’s body can support the availability of energy needed.
by muscles and brain to work optimally. Sources of energy can be obtained from a variety of food sources, such as carbohydrate, fat, and protein. The speed at which energy is formed by our body has a great influence on our physical performance. In addition, the amount of energy formed is contingent upon a number of factors, including: the substrate concentrate of the main source of energy and the intensity of the physical activities being performed. According to Wolinsky (1994), optimal food can provide sufficient energy that generates work power and allows for more effective, faster recovery from fatigue, since the nutrient reserve can be reused at a state of homeostatic.

To optimize muscle work and cardiorespiratory system, our body needs vitamins and minerals that regulate and assist the chemical reaction of energy-producing nutritious substances, as co-enzyme and co-factor. In the event when one or more of them suffers deficiency, exercise capacity can be hampered. The need for water-soluble vitamins (B and C) increases when our body needs more energy. Research suggests that moderate-level depletion of iron can decrease exercise performance. The vitamins and minerals that are importantly related to sport activities are such vitamins as A, B, C, D, E and K, and such minerals as Ca, Fe, Na, K, P, Mg, Cu, Zn, Mn, J, Cr, Se and F (Clark, 1996).

Nowadays, many supplementary food and drinks are produced and often consumed by athletes to support their sporting activities and help them achieve top performance. One of alternative source of energy that can also function as energy reserve is palm sugar. Palm sugar contains complex carbohydrate and 368 kilocalories (Depkes, 2012). It also contains important minerals needed to support metabolism process and optimize our muscles, heart, and lungs work.
The contents of nutritional and mineral substances in every 100 gram of palm sugar are shown in the table below.

Table 1: Nutritional contents of every 100 gram of *Palm Sugar*

<table>
<thead>
<tr>
<th>No</th>
<th>Nutritional Substance</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Energy</td>
<td>386kcal</td>
</tr>
<tr>
<td>2</td>
<td>Carbohydrate</td>
<td>97,3 gr</td>
</tr>
<tr>
<td>3</td>
<td>Protein</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Fat</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Water</td>
<td>1,6 gr</td>
</tr>
<tr>
<td>6</td>
<td>Calcium (Ca)</td>
<td>85, mg</td>
</tr>
<tr>
<td>7</td>
<td>Iron (Fe)</td>
<td>1,9 mg</td>
</tr>
<tr>
<td>8</td>
<td>Magnesium (mg)</td>
<td>29,0 mg</td>
</tr>
<tr>
<td>9</td>
<td>Phosphor (P)</td>
<td>22,0 mg</td>
</tr>
<tr>
<td>10</td>
<td>Potassium (K)</td>
<td>346,0 mg</td>
</tr>
<tr>
<td>11</td>
<td>Natrium (Na)</td>
<td>39,0 mg</td>
</tr>
<tr>
<td>12</td>
<td>Zinc (Zn)</td>
<td>0,18 mg</td>
</tr>
<tr>
<td>13</td>
<td>Selenium (Se)</td>
<td>1,2 mg</td>
</tr>
<tr>
<td>14</td>
<td>Thiamin</td>
<td>0,08 mg</td>
</tr>
<tr>
<td>15</td>
<td>Riboflavin</td>
<td>0,7 mg</td>
</tr>
<tr>
<td>16</td>
<td>Niacin</td>
<td>0,082 mg</td>
</tr>
<tr>
<td>17</td>
<td>Pyridoxine</td>
<td>0,026 mg</td>
</tr>
</tbody>
</table>

*source: Directorate of Nutrition, Department of Health, RI (in Hatta, 1994)*
The other benefit of palm sugar is that it contains low Index Glycemic (IG) and it dissolves gradually in our body fluid over a long time. For these reasons, palm sugar can quickly produce energy (Bandrek & Legiit, 2010).

A study by the Philippine Food and Nutrition Research Institute reports that palm sugar contains more macro nutrient than do honey and sugar cane, as well as nitrogen, chloride (Cl), sulfur, and boron that are not found in other sweeteners. Since it does not dissolve in our body fluid quickly, palm sugar can produce energy for longer time (Nur Muhamad, 2012).

So far palm sugar has only been used in household industries, mainly as an ingredient of cakes, drink sweeteners, and energy drink such as gentong mas (Sikirman, 2012). To date, there has not been any study yet on the benefits of palm sugar as supplementary drink that supports sporting activities.

A study by Saiful (2013) on 2010-2011 students of Penjaskes-Rek of FKIP-UHO found that, compared to drinking mineral water, consuming 250 ml drink of 80% palm sugar 30 minutes prior to exercising had a more significant effect on the improvement of aerobic endurance.

In this current study, the researcher added 5% of natrium chloride to the drink containing 80% of palm sugar. Natrium chloride is one important element to help with muscles relaxation and assist cells to absorb nutrients (Mc. Ardle, 1994).

Considering the aforementioned reasons, this study was set out to determine:

a. The effect of consuming drink with 80% of palm sugar prior to exercising on aerobic endurance.
b. The effect of consuming drink with 80% of palm sugar plus 5% of NaCl on aerobic endurance.

c. The different effects resulted from consuming drink with 80% of palm sugar and from drinking 80% palm sugar plus 5% NaCl on aerobic endurance.

METHOD

This study used an experimental design and employed a randomized pre-test post-test control group design (Sugiyono, 2006). The experiment was conducted at the Sport Centre of Halu Oleo University of Kendari for 5 months, from May to September 2014.

The population of the study was all year 2011 and 2012 students of Penjaskes-Rek department at FKIP Halu Oleo University, totaling 157. The sample were 60 students, who were determined through a simple random sampling technique.

To measure aerobic endurance, a “Multi Stage test” (McKenzie, 1999) instrument was used, that is, having students make a 20-meter two-way run, while synchronizing with certain rhythms.

Regarding the research procedure, the following stages were taken in this study:

1. Preparing research materials and conducting a chemical analysis on the mineral contents of palm sugar.
2. Administering a pre-test in the form of stage test, to obtain a preliminary data about the aerobic endurance of all samples of the study.
3. Once the data of initial aerobic endurance from the results of pre-test were collected, the samples were split into 3 (three) groups by using a technique of matched ordinal pairing. The three groups were:
• First experimental group, comprising 20 students.
• Second experimental group, comprising 20 students.
• Control group, comprising 20 students.

1. Conducting first, second and third replicated experiments to each group, in the following manner:
   
a. Each student in the first experimental group was asked to consume 250-ml drink containing 80% palm sugar 30 minutes before starting exercise.

b. Each student in the second experimental group drank 259-ml drink containing 80% of palm sugar plus 5% of NaCl 30 minutes prior to exercising.

c. Each student in the control group drank 250 ml mineral water.

d. Thirty minutes after drinking the palm sugar, all students took a multi stage test in their own groups, to measure their aerobic endurance.

e. A period of one month after the first experiment was allowed before replicating it in the second experiment, and another one month before doing it the third time.

RESULTS

A. Aerobic Endurance

This study measured the aerobic endurance of the subjects in three groups of treatment, comprising one pre-test group (which consumed mineral water) and three replicated experiments with 80% palm sugar, and pretest group (which consumed mineral water) and three replicated experiments with 80% palm sugar plus 5% natrium chloride (NaCl). The following table presents a description of the aerobic endurance of the students in those three groups.

**Table 2**
A Summary of the Treatment Group’s Characteristics of Aerobic Endurance
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>StDev</th>
<th>Var</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-1</td>
<td>45,027</td>
<td>2,787</td>
<td>7,768</td>
<td>40,8</td>
<td>44,9</td>
<td>51,4</td>
<td>10,6</td>
</tr>
<tr>
<td>80%-P1</td>
<td>49,02</td>
<td>5,39</td>
<td>29,04</td>
<td>43,3</td>
<td>46,5</td>
<td>63,2</td>
<td>19,9</td>
</tr>
<tr>
<td>80%-P2</td>
<td>50,02</td>
<td>5,5</td>
<td>30,21</td>
<td>44,2</td>
<td>47,1</td>
<td>62,5</td>
<td>18,3</td>
</tr>
<tr>
<td>80%-P3</td>
<td>50,21</td>
<td>5,47</td>
<td>29,97</td>
<td>43,9</td>
<td>47,1</td>
<td>63</td>
<td>19,1</td>
</tr>
<tr>
<td>PRE-2</td>
<td>46,642</td>
<td>4,148</td>
<td>17,208</td>
<td>40,5</td>
<td>45,8</td>
<td>58,2</td>
<td>17,7</td>
</tr>
<tr>
<td>80%+5% NaC-P1</td>
<td>50,085</td>
<td>4,817</td>
<td>23,205</td>
<td>43,3</td>
<td>50,2</td>
<td>63</td>
<td>19,7</td>
</tr>
<tr>
<td>80%+5%NaCL-P2</td>
<td>51,042</td>
<td>4,437</td>
<td>19,685</td>
<td>44,5</td>
<td>51,9</td>
<td>64,5</td>
<td>20</td>
</tr>
<tr>
<td>80%+5%NaCL-P3</td>
<td>50,915</td>
<td>4,454</td>
<td>19,841</td>
<td>45,2</td>
<td>51,2</td>
<td>64,3</td>
<td>19,1</td>
</tr>
</tbody>
</table>

Notes:

PRE-1 = Pre-test 1 with 80% palm sugar
PRE-2 = Pre-test 2 with 80% palm sugar +5%NaCl
P1 = Experiment/replication 1
P2 = Experiment/replication 2
P3 = Experiment/replication 3

2. Hypothesis Testing

The results of testing the difference in the aerobic endurance demonstrated by pre-test group which consumed 80% *palm sugar* and by the pre-test group which drank 80% *palm sugar* + 5% NaCl are shown in the next table.
A test on Aerobic Endurance Difference by Pre-test Group with 80% *palm sugar* and a Pre-test Group with 80% *palm sugar*+5% NaCl

<table>
<thead>
<tr>
<th>Source</th>
<th>DB</th>
<th>Total of Quadrats</th>
<th>Average of Quadrats</th>
<th>F&lt;sub&gt;count&lt;/sub&gt;</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>33,9</td>
<td>33,9</td>
<td>2,72</td>
<td>0,106</td>
</tr>
<tr>
<td>Galat</td>
<td>50</td>
<td>624,4</td>
<td>12,5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>658,3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows that there was no significant difference between the aerobic endurance possessed by the research subjects in the pre-test group that consumed 80% palm sugar and that which was possessed by the pre-test group with 80% palm sugar + 5% NaCl. This was indicated by the value of F<sub>count</sub> = 2.72, with a probability of p = 0.106 > out of the value of α = 0.05. A comparison of the aerobic endurance average between the two pre-test groups is presented in the next figure
Figure 1

A Histogram of the Average Scores of Pre-test I and Pre-test II

2. Testing the Group which consumed 80% *Palm Sugar* and the Group which consumed 80% *Palm Sugar* + 5% NaCl

The results of variants analysis to determine the overall difference in aerobic endurance between the group receiving 80% palm sugar and those consumed 80% *palm sugar* + 5% NaCl are summarized in the following table:

**Table 4**

<table>
<thead>
<tr>
<th>Source</th>
<th>DB</th>
<th>Total of Quadrat</th>
<th>Average of Quadrat</th>
<th>F-count</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>1</td>
<td>33,9</td>
<td>33.9</td>
<td>1.36</td>
<td>0.245</td>
</tr>
</tbody>
</table>

Results of Testing the difference in aerobic endurance between the group consuming 80% *Palm Sugar* and that which consumed 80% *Palm Sugar+5% NaCl*
Table 4 shows that there is no significant difference in the aerobic endurance between the group consuming 80% *palm sugar* and those which received 80% palm sugar + 5% NaCl. This is indicated by the value of $F_{count} = 1.36$, with a probability ($p$) = 0.245, which is higher than the value of $\alpha = 0.05$. A comparison of the average of aerobic endurance by both groups is presented in the next figure.

**Figure 2**

A comparison of aerobic endurance between the group consuming 80% Palm Sugar and the one taking 80% Palm Sugar + 5%NaCl.
3. Testing the Group that Consumed 80% Palm Sugar

Prior to testing the hypothesis of this study, a variants analysis was done to measure the difference of aerobic endurance experienced by all four experimental groups, both those which consumed 80% palm sugar and the ones taking 80% palm sugar + 5% NaCl. The following table summarizes the results of the variants analysis.
Table 5

Testing the difference of aerobic endurance of the group consuming 80% *Palm Sugar*

<table>
<thead>
<tr>
<th>Source</th>
<th>DB</th>
<th>Sum of Quadrat</th>
<th>Average of Quadrat</th>
<th>F-count</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment (Replication)</td>
<td>3</td>
<td>456,2</td>
<td>152,1</td>
<td>6,72</td>
<td>0,001</td>
</tr>
<tr>
<td>Galat</td>
<td>100</td>
<td>2424,9</td>
<td>24,2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>2881,1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It can be seen from Table 5 that there is a difference in the aerobic endurance among the four groups that received treatment, which comprise one pre-test group and three replicated experiments (P1, P2, P3) that consumed 80% *palm sugar*, as indicated by the value of $F_{count} = 6,72$, with a probability (p) = 0,001, that is lower than the value of $\alpha = 0,05$. Next, a test on the difference of aerobic endurance among the groups receiving treatment was administered to determine which group experienced more significant difference. The results of the difference testing are summarized in the following table.
Table 6.

The results of variants Analysis to determine the difference in aerobic endurance between different treatments to the groups taking 80% *Palm Sugar*

<table>
<thead>
<tr>
<th></th>
<th>PRETEST-1</th>
<th>P11</th>
<th>P12</th>
<th>P13</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRETEST-1</td>
<td>F-count= 11,24</td>
<td>F-count= 17,09</td>
<td>F-count= 18,49</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P = 0,002</td>
<td>P = 0,000</td>
<td>P = 0,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td></td>
</tr>
<tr>
<td>P11</td>
<td>F-count= 11,24</td>
<td></td>
<td>F-count= 0,450</td>
<td>F-count= 0,63</td>
</tr>
<tr>
<td></td>
<td>P = 0,002</td>
<td></td>
<td>P = 0,508</td>
<td>P = 0,432</td>
</tr>
<tr>
<td></td>
<td>F-tab= 2,00</td>
<td></td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
</tr>
<tr>
<td>P12</td>
<td>F-count= 17,09</td>
<td>F-count= 0,450</td>
<td></td>
<td>F-count=</td>
</tr>
<tr>
<td></td>
<td>P = 0,000</td>
<td>P = 0,508</td>
<td></td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td></td>
<td>F-tab= 2,00</td>
</tr>
<tr>
<td>P13</td>
<td>F-count= 18,49</td>
<td>F-count= 0,63</td>
<td>F-count= 0,010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P = 0,000</td>
<td>P = 0,432</td>
<td>P = 0,904</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td></td>
</tr>
</tbody>
</table>

It is clear from Table 6 that there was a difference in the aerobic endurance between the pre-test group which consumed mineral water and the group taking 80% *palm sugar* in the first, second, and third replicated treatments. This is
indicated by the value of $F_{\text{count}} = 11.24 > F_{\text{table}} \cdot 2.00$, at the probability value of $(p) = 0.002 < \alpha = 0.05$. With regard to the results of the first, second, and third replicated treatments, there was no significant difference between one and the others, as was indicated by the probability value of $(p) = 0.904 > \alpha = 0.05$. The difference in the aerobic endurance among the four experimental groups which consumed 80% palm sugar is presented in Table 3 below.

![Average Score](image)

**Figure 3**

The Average Score of Aerobic Endurance between Pre-test I and Replicated Treatment I, II, and III with 80% Palm Sugar

Figure 3 visually suggests that a treatment with 80% palm sugar can improve the aerobic endurance of the subjects which received 3 (three) replicated experiments, compared to those subjects which only consumed mineral water in the beginning (pretest).
4. Testing the Group which consumed 80% *Palm Sugar* + 5% NaCl

The results of variants analysis that determines the difference in the aerobic endurance of the group which received 80% *palm sugar* + 5% NaCl are summarized in Table 7.

Table 7

<table>
<thead>
<tr>
<th>Source</th>
<th>DB</th>
<th>Sum of Quadrat</th>
<th>Average of Quadrat</th>
<th>F-count</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment (Replication)</td>
<td>3</td>
<td>332,1</td>
<td>110,7</td>
<td>5,54</td>
<td>0,001</td>
</tr>
<tr>
<td>Galat</td>
<td>100</td>
<td>1998,5</td>
<td>20,0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>2330,6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7 indicates that there was a difference in the aerobic endurance of the subjects in the groups that received treatments, which comprises one pre-test group and one group receiving three replicated treatments (P1, P2, P3) with 80% *palm sugar* + 5% NaCl. This was shown by the value of $F_{\text{count}}$ with a probably of $p = 0,001 < \alpha = 0,05$. A test on the difference of aerobic endurance between the four groups was then conducted to determine the extent to which each of the treatment affected significantly. The results of this test is presented in Table 6 below.
Table 8

The results of Varian Analysis which determines the aerobic endurance difference between the groups consuming 80% *Palm Sugar* + 5% NaCl

<table>
<thead>
<tr>
<th></th>
<th>PRETES-2</th>
<th>P21</th>
<th>P22</th>
<th>P23</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRETEST-2</td>
<td>F-count= 7,62</td>
<td>F-count= 13,64</td>
<td>F-count= 12,81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P = 0,008</td>
<td>P = 0,001</td>
<td>P = 0,001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td></td>
</tr>
<tr>
<td>P21</td>
<td>F-count= 7,62</td>
<td>F-count= 0,56</td>
<td>F-count= 0,42</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P = 0,008</td>
<td>P = 0,459</td>
<td>P = 0,521</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td></td>
</tr>
<tr>
<td>P22</td>
<td>F-count= 13,64</td>
<td>F-count= 0,56</td>
<td>F-count= 0,01</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P = 0,001</td>
<td>P = 0,459</td>
<td>P = 0,918</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>F-tab= 2,00</td>
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</tr>
<tr>
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<td>F-count= 0,42</td>
<td>F-count= 0,001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P = 0,001</td>
<td>P = 0,521</td>
<td>P = 0,918</td>
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<tr>
<td></td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td>F-tab= 2,00</td>
<td></td>
</tr>
</tbody>
</table>

As is obvious from Table 8, there was a difference in the aerobic endurance between the pre-test group (which consumed mineral water) and the experimental group which took 80% *palm sugar* + 5% NaCl in the first, second, and third replicated treatment. This is indicated by the value of $F_{count} = 7,62$, which is higher than the value of $F_{tabel} = 2,00$, at a probability value of $(p) = 0,008$, that is lower than $\alpha = 0,05$. 

325
The results of the first, second, and third replicated treatment, however, showed no significant differences between one and the others, since the probability value was \( p = 0.45 \), which is higher than the value of \( \alpha = 0.05 \). The difference of the average score of the aerobic endurance between the four experimental groups that consumed 80% palm sugar is shown in Table 4.

Figure 4

The average score of the aerobic endurance of the Pre-test I group and the group receiving three replicated experiments with 80% Palm Sugar + 5% NaCl

Figure 4 indicates that the experiments with 80% \textit{palm sugar} + 5% NaCl can improve the aerobic endurance of the subjects in this study who received three replicated treatments, a result not demonstrated by the group that drank mineral water at the beginning of the experiment (pre-test).
DISCUSSION

Based on the results of the statistical analysis of the aerobic endurance prior to treatment (pre-test) that was given to the experimental group (that consumed 80% of palm sugar solution), it was found that there was no significant difference, as indicated by the value of $F_{\text{count}}$ with a probability $p = 0.106$, which is higher than the value of $\alpha = 0.05$. Similarly, the second experimental group which took a solution of 80% palm sugar plus 5% NaCl did not show a significant difference, as can be implied from the value of $F_{\text{count}}$ with a probability $p = 0.245$, which was higher than the value of $\alpha = 0.05$. Based on the results of these testings, it can be claimed that prior to the treatments, all the three groups (i.e., the experimental groups with 80% palm sugar 80%, the one with palm sugar 80% + 5 NaCl, and the control group) showed a similar degree of aerobic endurance. Therefore, since the results of the experiments indicated a difference in aerobic endurance, it is conclusive to say that the difference was the result of the given treatments.

The experiments conducted in this study were replicated three times, with a time interval of one month between each experiment. The purpose of doing these was to avoid the effect of exercise or endurance test.

The testing on the control group (which consumed mineral water) and the first experimental group (to which a solution of 80% palm sugar was applied in the first, second, and third experiment) showed a significantly different result. This was indicated by the value of $F_{\text{count}}$ which is higher that the value of $F_{\text{table}}$, and the probability value ($p$) which is lower than the value of $\alpha = 0.05$. The same case occurred to the experimental group which received a solution of 80% palm sugar plus 5% Natrium Chloride (NaCL), demonstrating a significant difference between the
first, second, and third treatment, and the pre-test group, in which the value of $F_{\text{count}}$ was higher that the value of $F_{\text{table}}$ with a probability value $(p) = 0.001$, which was lower than $\alpha = 0.05$. Therefore, this result indicated that applying a solution of 80% palm sugar 80%, with or without adding 5% NaCl, can have a significant effect on the improvement of aerobic endurance.

In the first, second, and third replicated experiments with a solution of 80% \textit{palm sugar} 80\%, there was no significant difference between one and the others, as was indicated by the value of probability $(p)$ which was higher than $\alpha = 0.05$. Likewise, the group receiving a solution of 80% \textit{palm sugar} + 5% NaCl in the first, second, and third replicated experiments shown no significant difference since its probability value $(p)$ was higher $\alpha = 0.05$.

The difference between the experimental group receiving 80% \textit{palm sugar} and the one with 80% \textit{palm sugar} +5% NaCl has evidently not shown any differences in the aerobic endurance either in the first, second, or third replicated experiment, given that the value of $F_{\text{count}}$ with the probability $(p)$ value of 0.245 was higher than the value of $\alpha = 0.05$.

Based on these results, the first hypothesis of this study, that is, applying a solution of both 80% palm sugar and 80% palm sugar +5% NaCl 30 minutes prior to exercising can have an effect on aerobic endurance, seems to be accepted. In contrast, the second hypothesis, which states that consuming 80% palm sugar 80% + 5% NaCl can have a better effect than only 80% \textit{palm sugar}, is rejected. Nevertheless, descriptively speaking, the aerobic endurance resulted from consuming 80% palm sugar 80% plus 5% NaCl is a bit better after the first, second, and third treatment pertama, with an average of aerobic endurance $= 50.89$, in comparison to the
experimental group that received 80% palm sugar, with an average of aerobic endurance = 49.28.

The improvement of aerobic endurance that was demonstrated through this experiment has been made possible by the fact that palm sugar contains 386 kilocalories, as well as 97.3 kilocalories of complex carbohydrate in every 100 gram of palm sugar. This amount can generate a reserve of energy during an exercise. This is in line with Litwak’s (2003) view that the primary sources of energy for various level and types of physical activities can be generated from carbohydrate which mainly functions to maintain our body’s functional activates. Two types of carbohydrate have been known: simple and complex carbohydrates. Glucose is one type of simple carbohydrates that can be directly used as a source of energy by our body’s cells, and when the amount of glucose exceeds, it will be converted into a reserve of glycogen in our liver and muscles.

In addition to supporting human body’s biological activities, the nutrient and mineral contents of palm sugar function to control and clean our digestive tract, from the stomach to throat, since palm sugar also contains Reboflavin that functions to expedite metabolism and optimize cell function, to maintain great stamina that can help with the formation of red blood cells; generates antibody, along with enzymes generates energy needed by human body; along with vitamin A repairs the mucous membranes of the digestive tract; and inhibits cell damage during the process of energy production (Jef Gunning, 2004). Other mineral contained in palm sugar is thiamin; which functions as co-enzyme in the process of energy metabolism; strengthens nerve and muscle system; assists our body in creating and using protein. Palm sugar contains more macro nutrient than does sugar cane, as well as other
minerals not contained in other sweeteners, such as nitrogen, chloride (Cl), sulfur, and boron (http://www.asiamaya.com/nutrients/gula jawa.htm).

The other advantage of palm sugar is that it dissolves in our body gradually, so that it can generate energy for a relatively longer period, one thing that helps athlete improve their stamina during a physical activity. (http://id.wikipedia.org/wiki/Gulaaren)

The natrium (Na) contained in palm sugar functions as nerve transmitter, assists in muscle contractions, maintains osmotic blood pressure, serves as a buffer (in the form of Nakarbonat), and maintains muscle cell irritability. The inorganic component of extra cell fluid and the protein contained in palm sugar have an important role to improve the system of muscle performance and the work of cardio-respiration, as well as to increase body stamina and endurance. The vitamins contained in palm sugar are also vital to human body, especially because our body cannot produce vitamin, so that vitamin intake from the outside is greatly needed (Nur Muhammad, 2012).

It is evidently a good idea to consume a solution of palm sugar half-an-hour prior to doing exercises, considering that palm sugar has a low index of glicemic, making it need a long time to convert glucose into energy. The conversion of palm sugar into glukosa normally takes about 3-5 minutes, whereas from glukoce into energy also takes about 3 – 5 menit or more. Consuming such drink 30 minutes before starting a physical activity will not cause our stomach to work hard when doing the activity, since by then the food intake has been converted into ATP and stored in muscle cells, so that it will not cause any psychologically harmful effect on the body.

This research has added 5% of natrium chloride (NaCl) into the 80% palm sugar solution, with a view to further improve aerobic endurance, given that natrium
chloride functions to assist our muscle work by helping our nerves to relax and by improving the performance of inter-cell electrical signal transmission. It also helps with the absorption of nutrition by our body cells. However, this study has demonstrated that there was no significant difference in aerobic endurance between the group with additional 5% NaCl and the first experimental group with only 80% palm sugar. This was because the drink consumed by the first experimental group actually contains NaCl as well, albeit in a very small amount. According to McArdle (1994), our body only needs a very small amount of NaCl, that is, 200-250 mg per day, and if this amount exceeds, the working system of our lung will be negatively affected, as a result of an increase of pressure in our vascular. For this reason, natrium chloride should only be added to a solution of palm sugar in a small amount, or approximately 5%.

CONCLUSION

It can be concluded from this study that:

1. Overall there is no significant difference in the aerobic endurance resulted from consuming either 80% palm sugar or 80% palm sugar + 5% NaCl. In other words, the improvement of aerobic endurance resulted from these two different mixtures of concentrated solution is relatively the same.

2. There is a significant difference between the aerobic endurance experienced by the pretest group which consumed mineral water and that which was shown by the experimental group taking 80% palm sugar, both in the first, second, and third treatment. Consuming 80% palm sugar can evidently improve the aerobic endurance of the subjects in this study.
3. There is a significant difference between the aerobic endurance experienced by the pretest group which consumed mineral water and that which was demonstrated by the experimental group drinking 80% palm sugar + 5% NaCl in the first, second, and third replicated treatment. A treatment which involved the consumption of 80% palm sugar + 5% NaCl seemed to be effective in improving the aerobic endurance of the subjects of this study.

SUGGESTIONS

Based on the findings of this study, the following suggestions are offered:

1. Given that consuming a solution of 80% palm sugar 30 minutes prior to exercising had evidently a significant effect on aerobic endurance, it is suggested that athletes, coach, and anyone who may concern consider the results of this study in order to improve their aerobic and to be able to perform physical activities in a longer-than-usual period.

2. This study has found that a concentrated solution with 80% palm sugar and the one with 80% palm sugar + 5% NaCl can evidently improve aerobic endurance. Regarding this finding, it is suggested that athletes, coach, dan anyone who may concern with sporting activities consume a solution of 80 palm sugar 80 or 80% palm sugar +5% NaCl as much as 250 ml before they start doing any physical activities or exercises, in order to improve their aerobic and cardio-respiratory endurance.
Reference

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McKenzie.B (1999) Multistage Uji kebugaran jasmani. from


Sukirman, 2012 *Tanaman Obat:Manfaat Gula Aren Bagi Kesehatan.* From

ABSTRACT
This research is descriptive research. The purpose of this study was to analyze the effectiveness of motion in learning physical education.

This research was conducted at the Junior High School in Yogyakarta. This study was conducted in August 2014. Instruments in this study used observation and assistance software sports biomechanics (dartfish) to help analyze the motion. Data was collected by observation with video footage obtained during the learning process of physical education. Data analysis and interpretation of the data was done by descriptive data collected through video recordings. Quantitative analysis with descriptive statistics on the percentage. Qualitative analysis is done with motion analysis software with the help of sport biomechanics "dartfish".

Based on the results of research and discussion, it is known that students who do actively movement by 46 %, do the motion was by 25 %, and that does not actively movement by 29 %. So it can be said that the average proportion of active time and motion study student enrollment of more than 40 %, the participation rate of students is an indicator that is included in either category. Physical education model with more games increase engagement of learners in moving along the learning process.

Key word: Physical Education, motion analysis

INTRODUCTION
Low levels of physical fitness of students in schools of all levels of the educational unit in Indonesia can be used as a general guide that quality physical education program in Indonesia is still low. From a survey conducted by the center of physical fitness department of national education, obtained information that physical education learning outcomes in schools generally only able to give the effect of physical fitness for about 15 % of the total student population. While in the simple search through the test Sport Search (instruments talent identification) in aspects
related to the physical fitness of high school students, learners Indonesian average only reaches the category "Low" (Pusat Kesegaran jasmani Depdiknas, 2003).

Physical education is a part of education as a whole and has been appreciated as an important part of the national education system. It is included in undang-undang No. 20 tahun 2003 about system of national education pasal 1 ayat 1, which reads as follows: Education is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing the potential for him to have the spiritual strength of religious, self-control, personality, intelligence, noble character, and skills needed him, society, nation and state (Undang-Undang Sistem Pendidikan Nasional, 2003).

Physical education is an integral part of education as a whole which contains a set of learning materials that make a real contribution in everyday life as an effort to boost growth, physical and spiritual development of students. Therefore, the implementation of physical education should be developed towards a more optimized so that learners will be more creative, innovative, skilled, have healthy habits, which can lead to an active physical fitness, and have a knowledge and understanding of human movement. Physical education has a clear pedagogical goals and teerarah, therefore the motion as physical activity is a natural basis for humans to learn about the world and himself.

Now, physical education and sport weight occupy the same status as other subjects, both among policy makers, teachers and members of the general public: Physical education has been recognized as important as academic studies and the formation of morals (Mutohir, 2004: 4). Teachers in determining learning strategies in the classroom is very helpful in achieving successful learning. Teachers should be able to accommodate aspects of the human person, to optimize the entire workings of
the brain, and is able to generate high motivation of the students to achieve the success of the creation of the learning process. So creativity is at stake for the teacher can design a learning device that can accommodate these aspects in all competencies.

Today is suppose to teach physical education teachers use methods that are less in accordance with the conditions of students and learning objectives. In addition, the lack of support for both the learning process of the school and the local government in the fulfillment of the necessary facilities and infrastructure so as to make the learning process becomes less effective. This is consistent with the statement Mutohir (2004), that the condition of physical education and sports, especially the quality of teaching is less encouraging. So that the problem whether the current appearance of the physical education teachers in the learning process is in accordance with what is expected.

Teacher effectiveness in implementing the learning process is very influential on the product of learning itself, especially in learning physical education teacher requires modifying a wide variety of teaching methods and apply methods varied so that learners actively and directly involved in the learning process of motion. Answering the above problems is certainly not easy. Required a careful search that involves a multidisciplinary study of a variety of tools, both of which involve a review of the philosophical aspects, biomechanics, sociological, psychological, cultural, and economic. Therefore the aim of this study was to analyze the effectiveness of motion in physical education and sports in school.
RESEARCH METHOD

This research was conducted at the Junior High School in Yogyakarta. This study was conducted in August 2014. Instruments in this study used observation and assistance software sports biomechanics (dartfish) to help analyze the motion. Data was collected by observation with video footage obtained during the learning process of physical education and sport. Data analysis and interpretation of the data was done by descriptive data collected through video recordings. Quantitative analysis with descriptive statistics on the percentage. Qualitative analysis is done with motion analysis software with the help of sport biomechanics "dartfish".

RESULTS

The data collected is data on the motion activity of the learning process with the material physical education by Basketball game with a 3 on 3 game system derived from the study sample. To analyze the effectiveness of motion in the learners during the learning process physical education movement can be seen in the level of activity undertaken density learners. Based on the model of the game is performed during the learning process physical education with Basketball game system with game 3 on 3 Basketball can be described that the game is played for 5 minutes, each of his team consists of 3 people by using half of the field, so that one field can be used simultaneously for 12 children the learning process. Learning of physical education by Basketball model with a model of game 3 on 3 is suitable and in accordance with the form of explicit learning success indicator in the curriculum approach.

Basketball is a game of physical activity in the group games and sports activities. Expected competencies achieved in the game Basketball learning in school, specifically manifested in the form of explicit learning success indicators in KTSP.
(2006; 135) as follows, (1) Perform a variety of ball possession, (2) Dribble, (3) Shoot the ball (shooting), (4) Perform a variety of forms of passing, (5) Developing teamwork in the game, and (6) Perform Basketball game with applicable regulations.

The following table details the analysis of the motion of the motor density Basketball game in teaching physical education.

**Table 1. Data of the motion analysis of movement density**

<table>
<thead>
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<th>Name</th>
<th>No</th>
<th>Movement</th>
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<th>Category</th>
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</thead>
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<td>Active</td>
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<td>2</td>
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<tr>
<td></td>
<td>3</td>
<td>Passing</td>
<td>6</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Shooting</td>
<td>0</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Jump shoot</td>
<td>7</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Lay-up</td>
<td>2</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Rebound</td>
<td>7</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Block</td>
<td>0</td>
<td>✓</td>
</tr>
<tr>
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<td>1</td>
<td>Dribble in place</td>
<td>5</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Dribble to run</td>
<td>2</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Passing</td>
<td>5</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Shooting</td>
<td>0</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Jump shoot</td>
<td>7</td>
<td>✓</td>
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<tr>
<td></td>
<td>6</td>
<td>Lay-up</td>
<td>0</td>
<td>✓</td>
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<tr>
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<td>7</td>
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<td>Dribble in place</td>
<td>5</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dribble to run</td>
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</tr>
<tr>
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<td>Passing</td>
<td>6</td>
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<tr>
<td>4</td>
<td>Shooting</td>
<td>0</td>
<td>✓</td>
<td></td>
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<tr>
<td>5</td>
<td>Jump shoot</td>
<td>6</td>
<td>✓</td>
<td></td>
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<tr>
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<td>Lay-up</td>
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<td></td>
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<td>Dribble in place</td>
<td>4</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dribble to run</td>
<td>5</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Passing</td>
<td>2</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>Shooting</td>
<td>0</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Jump shoot</td>
<td>2</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Lay-up</td>
<td>5</td>
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<tr>
<td>7</td>
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<td></td>
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<tr>
<td>1</td>
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<td>6</td>
<td>Lay-up</td>
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<td>✓</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rebound</td>
<td>2</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
Data of analysis results in the table above can be simplified as follows:

**Table 2. Categories of activeness motion**

<table>
<thead>
<tr>
<th>Name</th>
<th>Aktive</th>
<th>Medium</th>
<th>Passive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>A</td>
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<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>D</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>2</td>
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<td>8</td>
</tr>
<tr>
<td>F</td>
<td>3</td>
<td>5</td>
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<tr>
<td>Total</td>
<td>22</td>
<td>12</td>
<td>14</td>
<td>48</td>
</tr>
<tr>
<td>Percentage</td>
<td>46%</td>
<td>25%</td>
<td>29%</td>
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</tbody>
</table>
DISCUSSION

Playing is an important activity for the growth and development of the physical, social, emotional, intellectual, and spiritual wellbeing. By playing the child can recognize the environment, interact, and develop emotion, and imagination as well. Play is for fun activities that occur naturally. Children do not feel compelled to play, but they will have fun, kanikmatan, information, knowledge, imagination, and social motivation. The play has a very broad benefits, for children, teachers, parents and other benefits for the child. With the play can develop physical, motor, social, emotional, cognitive, creativity, language, behavior, sensory acuity, release tension, and therapy for physical, mental or other developmental disorders.

In general, from the description in Table 2 it can be seen that learners who actively movement by 46 %, do the motion was by 25 %, and that does not actively movement by 29 %. So it can be said that the average proportion of active time and motion study student enrollment of more than 40 %, the participation rate of students is an indicator that is included in either category. Therefore, pedagogical competence of teachers of physical education including good category. However, when analyzed based on the work it is clear that the longer the period of employment, then progressively decreasing pedagogic competence. Such a condition is already a misnomer. Typically, the work is directly proportional to the capabilities. There is a possibility that this occurred because of the lack of effective mechanisms for evaluating and supervising the implementation of learning. Looseness of the system as provide opportunities for teachers to perform duties not as demanded.

Physical education in this study using game Basketball team is given using the model 3 on 3 with a duration of 5 minutes. Learners movement techniques in the form of drible Basketball, passing, shooting, jump shoot, lay-ups, rebounds, and blocks.
above 3 times then categorized as active learners who apply the techniques in the
game of Basketball, whereas below 2 times then categorized the criteria are, and who
does not perform any techniques movements then the category is not active in the
movement to apply the technique in the game of Basketball.

Basketball is a game of physical activity in the group games and sports
activities. Expected competencies achieved in the game Basketball in school learning,
specifically manifested in the form of explicit learning success indicators in KTSP
(2006; 135), as follows : (1) Perform a variety of ball possession, (2) Dribble, (3)
Shoot the ball, (4) Perform a variety of forms of passing, (5) Developing teamwork in
the game, and (6) doing Basketball game with applicable regulations.

Bloom (1979), psychomotor domains related to the achievement of learning
outcomes through manipulation skills that involve muscle and physical strength.
Psychomotor realm is the realm associated with physical activity, such as : writing,
hitting, jumping, and so forth. Closely associated with the cognitive ability to think,
including in dalammnya ability to memorize, understand, apply, analyze, evaluate
mensistesis and capabilities. While the nature of the affective domain includes
behaviors such as attitudes, interests, self-concept, values, and morals. Physical
education is essentially an integral part of the education system as a whole, aims to
develop aspects of health, physical fitness, critical thinking skills, emotional stability,
social skills, reasoning and moral action through physical activity, and sport.

The following aspects are contained in the big ball game, especially game
Basketball team :

a. Psychomotor aspects

1) Perform a variety of control the ball, do drible in place and also drible while
running, doing passing the ball chest pass , pass over head and bound pass
(chest pass, pass over, pass reflective), do the shooting and jump shoot (shoot the ball and shoot while jumping), do a lay-up shoot (insert hook the ball by the way), rebound, block the ball, and perform pivot

2) Playing Basketball with modified rules and regulations are actually

b. Cognitive aspects

1) The students have the concepts and thinking skills in games and sports Basketball

2) Knowing how how to do a variety of control the ball, how do dribble in place and also dribble while running, doing passing the ball chest pass, pass over head and bound pass (chest pass, pass over, pass reflective), how do the shooting and jump shoot (shoot the ball and shoot while jumping), do a lay-up shoot (insert hook the ball by the way), rebound, how do block (block the ball), and how to pivot

c. Affective aspects

Jansen (1995), The students have an appreciation of play and exercise behavior manifested in values, such as self-confidence, cooperation, respect for friend and foe, honest, fair, open, fair play and others. Another problem associated with poor quality of physical education teachers is how they use the time. The use of time is a reflection of how people fill their lives with activities that have an impact for him. an outline of the use of time is divided into three major categories, the time for the basic needs (existence time), productive time (subsistence time), and recreation time (free time), each successive allocation is 10 hours, 9 hours, and 5 hours.
CONCLUSION

Learners who do actively motion by 46 %, do the motion was by 25 %, and that does not actively move by 29 %. So it can be said that the average proportion of active time and motion study student enrollment of more than 40 %, the participation rate of students is an indicator that is included in the category of good and physical education learning with game models increase the participation of learners in moving along the learning process.

REFERENCES


Undang-Undang Republik Indonesia No. 20 tahun 2003 Tentang Sistem Pendidikan Nasional. Jakarta: Depdiknas.
EFFECT OF TEACHING STYLE, CRAWL STROKE AND FLEXIBILITY OF THE BUTTERFLY STROKE

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Universitas Negeri Medan
Email: supra.yt@gmail.com

Abstract

The aim of this research is to find out the effect of teaching style, crawl stroke and flexibility toward butterfly stroke stroke skill in swimming. Experimental study with 2 x 2 x 2 factorial was designed. The data were analyzed by using “ANAVA” (Analysis Varians) and continued with Tuckey Test. The results of the research showed that (1) In general, experimental group of butterfly stroke stroke skill with inclusion style have higher result than those with reciprocal style. (2) There are interaction effect in the treatment between teaching style, crawl stroke and flexibility toward butterfly stroke stroke skill in swimming. (3) There are significant differences of butterfly stroke stroke skill in swim between inclusion style and reciprocal style of students who have high crawl stroke and high flexibility. (4) There are significant differences of butterfly stroke stroke skill in swim between inclusion style and reciprocal style of students who have low crawl stroke and high flexibility. (5) There are significant differences of butterfly stroke stroke skill in swim between inclusion style and reciprocal style of students who have high crawl stroke and low flexibility. (6) There are no significant differences of butterfly stroke stroke skill in swim between inclusion style and reciprocal style of students who have low crawl stroke and low flexibility.

Keywords: Teaching style, crawl stroke, flexibility, butterfly stroke stroke

The implementation of swimming teaching experience changes from one period to the next period. The form of the material with the aim of developing other forms of movement and shape styles can work well studied. Form of swimming movements consist of leg movement, arm movement, the movement took a breath, and the whole movement (Ernest
W. Maglischo, 2003: 95). The differences of each style swimming technique lies in its movement. Therefore, the element of motion in the pool is very complex, it is in swimming lessons or approaches to consider the use of appropriate learning methods. Method or style of teaching that this right must be tailored to the characteristics of learning that every effort be made and well designed.

Swimming skills are needed for graduates of the School of Physical Education study program, in addition to teaching at both schools as well as a plus that can be made to open an industrial capital in the field of aquatic sports. Swimming course includes a discussion of; 1). breathing 2). froant float) 3). floathing 4). kicking action 5). arm action 6). breathing 7). arm breath and kick coordination 8). Start 9). Reversal 10). finish 11). water trappen 12). Diving and 13). Game rules and matches organizational system (M. Murni, 2003: 10).

Based on the results of the initial survey and supported by the lecturer of the course other than swimming in 2004 - 2010, there are some findings that are the focus of attention of researchers in relation with the implementation of swimming classes in the School of Physical Education study program. The finding is the difficulty students in learning butterfly stroke stroke. The difficulty can be seen from the learning process of students who look heavy and from their comments during the learning style butterfly stroke stroke. The comments of the students of the School of Physical Education studies on learning butterfly stroke stroke is a movement that is difficult, requiring more power, requires high flexibility and rapid fatigue.

Based on the analysis of learning difficulties swimming the butterfly stroke stroke, researchers found obstacles to learning swimming butterfly stroke style of the student based on information from the lecturer of the course swimming are: First, the low appreciation of the material students swimming butterfly stroke style characterized by shows the attitude of bored and lazy repetitions (drill) with a tired excuse. Second: low mastery as a crawl stroke swimming technique renangan most basic style. Third: students are less interested to add
insight and knowledge about the sport (especially swimming) and follow the development of sport in the media, it is at the low point with a visit to the library faculty and universities, Fourth: the low student who has the will to self enrichment or study outside lecture hours to learn independently swimming facilities and infrastructure when the pool is very supportive, it can be seen from the low student visits to the pool to add exercise Unimed Nikken the five independent: lack of utilization of IT as an additional depth of knowledge, it can be seen from the student activity in social networks (eg facebook, twitter) that has not touched the realm of discussion.

Achievement of learning objectives can not be separated from the student's own self factor, faculty, infrastructure and the environment, including the style of a lecturer in delivering course material. Understanding the various styles of teaching become a teacher one needs to (a). face a number of students and different conditions, (b). learning objectives which include three cognitive, affective and psychomotor, and (c). Subject matter and the context that at the time of giving the task to a specific approach (M Mosston and Ashwort S, 1981: 249). In the learning process, the students learn in different ways, coming from different cultural backgrounds and experiences as well as different levels of motion. Achievement of learning objectives that include psychomotor domain, the cognitive and affective can be achieved in physical education and differences in teaching style can help facilitate the achievement of the third objective domain (M Mosston and Ashwort S, 2008: 449).

The role of the lecturer in outdoor learning process include determining and selecting appropriate learning styles and effective so that students can see and understand the learning material is presented in accordance with the expected goals. The ability of lecturers / teachers select and present the learning material is determined by the ability and experience in learning (M Mosston and Ashwort S, 2008: 19). Accordingly, it is to make the learning process of swimming, selected appropriate learning style and easy to apply to students, so that a variety
of basic movement and coordination of movement can be controlled properly.

The results of the observations of researchers supported by the input of other swimming lecturer of course, that teaches students in each area must have a difference with student teaching in other areas. With regard to the character who owned the students, lecturer of program of study in the School of Physical Education more apply / use command teaching style (conventional) on the grounds easier to implement, safety, uniformity, effective and time efficiency of achievement of learning objectives and swimming courses. Though there are many more styles of teaching that can be used and more have better benefits when compared with the teaching style of command. In the command style of teaching that many students are trimmed creativity and less attention to the potential of each student.

Of the eleven teaching styles that there is no best, but the accuracy or suitability of the use of the most important, the proper application of a teaching style that is used in the learning process, the more effective the objectives to be achieved. Based on these observations need to be noticed by the lecturer on the selection of teaching styles to the learning process of swimming butterfly stroke style better (M Mosston and Ashwort S, 2008: 10).

The efficiency and effectiveness of learning swimming butterfly stroke style, relates to mastery of basic swimming (crawl stroke) and the physical condition of students (especially kelentukannya level). Butterfly stroke swimming style is the most difficult to learn (Ernest W. Maglischo, 2003: 178). This style has a character of the most demanding physical movements of four aspects; such as hitting speed and requires upper body strength with good flexibility shoulder, pelvic flexibility, ankle flexibility, coordination and endurance. Corlett found essentially the movement of muscles (muscle action) swimming butterfly stroke style together with the crawl stroke swimming motions except motion arms and legs in a swimming butterfly stroke carried out simultaneously (Geoffrey Corlett, 1972: 161).
When viewed from the side swimming motion butterfly stroke style has much in common with the crawl stroke (front crawl stroke) one of which is a pattern of arm movement patterns that have the letter "S" (Ernest W. Maglischo, 2003: 147). Learning butterfly stroke stroke in a classroom, students are expected to have mastered crawl stroke (front crawl stroke) will provide challenges and opportunities for further positive leads to the development of self-swimmer to master three other swimming styles (all-round swimmer) and will provide support for school swimming pools and associations (Geoffrey Corlett, 1972: 155).

At the beginning of the learning style swimming butterfly stroke seen crawl stroke abilities of students and different levels of flexibility. The differences are due to differences in background motor activity, social life and heredity (genetics). Whereas in learning swimming butterfly stroke, crawl stroke swimming skills and body flexibility is needed (Geoffrey Corlett, 1972: 154). The distinction has to be getting the attention of the lecturer as the custodian of the swimming course, for students who have mastery crawl stroke and low flexibility tends to feel inferior and easy to surrender to face learning difficulties swimming butterfly stroke. Based on the need for application of force that effectively and efficiently teach that skill butterfly stroke swimming styles students can achieve well. This study aims to gain an overview of the differences in the effect of independent variables on the dependent variable. There are three independent variables in this study, the teaching style, crawl stroke swimming skills and flexibility. The dependent variable is the skill of swimming butterfly stroke (dolphin) students of PJS (School of Physical Education at the Department of State University of Medan.
METODE

The method used in this study is the method of experimental factorial design with 2 x 2 x 2 Determination of design refers to the opinion of Sudjana (Sudjana, 1994: 109-124), the experimental units are grouped into cells such that the experimental units in in a relatively homogeneous cell units and many experiments in the same cell with many treatments that are being studied. The treatment was done to the experimental units within each cell. In accordance with the study design, there are three kinds of data that should be collected: (1) Butterfly stroke swimming skills data, (2). Swimming skills crawl stroke data and (3). flexibility of data. To obtain the data on butterfly stroke swimming skills, crawl stroke swimming skills as well as data on the use of test and measurement flexibility. To measure the skills of swimming butterfly stroke stroke and crawl stroke skills, with instruments made of researchers, while for the flexibility of researchers using the trunk extension test instrument.

Analysis of the data in this study used the technique of analysis of variance (ANOVA) with two lanes factorial design 2 x 2 x 2 at significance level $\alpha = 0.05$. Before performing variance analysis, as a condition to meet the requirements of data analysis first tested the normality of the sample with Liliefors, while searching for the level of homogeneity of variance for the population by using the Bartlett test. Furthermore, if there was an interaction (results of calculations Anova) followed by Tuckey test aimed to determine the level of significance of $F$ calculated with a significance level $\alpha = 0.05$.

RESULT

This study was conducted in Swimming Pool Faculty of Sport Science, State University of Medan Jl. Willem Iskandar Psr V Medan, North Sumatra province in 2012 Implementation study for 8 weeks, in June-July 2012 The number of samples given treatment
is 64 people. Data resulting from the butterfly stroke swimming skills style used in the analysis of data in the form of outcome assessment processes butterfly stroke swimming skills and travel time to a distance of 25 m by using assessment instruments that have been prepared researchers and tested for validity and reliability. The assessment was conducted by three judges against butterfly stroke swimming skills previously given material swimming butterfly stroke stroke style of teaching that uses either inclusion or use the reciprocal teaching style. Before performing the test, the first try (the students) were given the opportunity to warm up. Implementation of the test is only given one time chance to swim butterfly stroke stroke with a distance of 25 m and the judging is done directly by the three judges, and retrieval time by a timer.
Table 1 Summary of results of calculation of the value of research data and primary school

<table>
<thead>
<tr>
<th>Flexibility (C)</th>
<th>Crawl Stroke (B)</th>
<th>Teaching Style (A)</th>
<th>Inclusion Style (A₁)</th>
<th>Resiprocal Style (A₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High (B₁)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High (C₁)</td>
<td>ΣX = 487,33</td>
<td>ΣX = 412,34</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ΣX² = 29708,56</td>
<td>ΣX² = 21554,21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X̄ = 60,92</td>
<td>X̄ = 51,54</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD = 1,78</td>
<td>SD = 6,56</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 8</td>
<td>n = 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low (B₂)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (C₂)</td>
<td>ΣX = 419,63</td>
<td>ΣX = 453,96</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ΣX² = 22159,87</td>
<td>ΣX² = 25817,04</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X̄ = 52,45</td>
<td>X̄ = 56,75</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD = 4,61</td>
<td>SD = 2,86</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 8</td>
<td>n = 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High (B₁)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (C₂)</td>
<td>ΣX = 454,53</td>
<td>ΣX = 291,11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ΣX² = 25973,44</td>
<td>ΣX² = 10891,19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X̄ = 56,82</td>
<td>X̄ = 36,39</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD = 4,61</td>
<td>SD = 6,53</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 8</td>
<td>n = 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low (B₂)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (C₂)</td>
<td>ΣX = 327,68</td>
<td>ΣX = 353,40</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ΣX² = 13524,20</td>
<td>ΣX² = 15759,68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X̄ = 40,96</td>
<td>X̄ = 44,18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD = 3,83</td>
<td>SD = 4,60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 8</td>
<td>n = 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ΣX = 1689,17</td>
<td>ΣX = 1510,81</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ΣX² = 91366,06</td>
<td>ΣX² = 23729,95</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X̄ = 52,79</td>
<td>X̄ = 47,21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD = 8,425</td>
<td>SD = 9,32</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 32</td>
<td>n = 32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results of the three judges judging are then taken on average to find a score of process as the test data by summing the results of the three judges then divided by three. From the results of process skills in total with time in the can by means of t-scores at first, after that in total the final test and the data obtained from the treatment, so it is a result of the use of teaching styles and teaching styles reciprocal inclusion.

Table 2 Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>4163.515*a</td>
<td>7</td>
<td>594.788</td>
<td>27.154</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>159998.000</td>
<td>1</td>
<td>159998.000</td>
<td>7304.340</td>
<td>.000</td>
</tr>
<tr>
<td>A</td>
<td>497.067</td>
<td>1</td>
<td>497.067</td>
<td>22.692</td>
<td>.000</td>
</tr>
<tr>
<td>A * B * C</td>
<td>99.551</td>
<td>1</td>
<td>99.551</td>
<td>4.545</td>
<td>.037</td>
</tr>
<tr>
<td>Error</td>
<td>1226.653</td>
<td>56</td>
<td>21.905</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>165388.167</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>5390.167</td>
<td>63</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .772 (Adjusted R Squared = .744)

Table 3 Summary of results of calculation of the value of research data and primary school

<table>
<thead>
<tr>
<th>Compared Group</th>
<th>Q_count</th>
<th>Q_table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P₁ with P₂</td>
<td>5.66</td>
<td>2.36</td>
<td>Signifikan</td>
</tr>
<tr>
<td>P₃ with P₄</td>
<td>2.59</td>
<td>2.36</td>
<td>Signifikan</td>
</tr>
<tr>
<td>P₅ with P₆</td>
<td>12.34</td>
<td>2.36</td>
<td>Signifikan</td>
</tr>
<tr>
<td>P₇ with P₈</td>
<td>1.94</td>
<td>2.36</td>
<td>No Signifikan</td>
</tr>
</tbody>
</table>

P₁ = Group crawl stroke skills high and high flexibility with inclusion teaching style
P₂ = Group crawl stroke skills high and high flexibility with teaching style reciprocal
P₃ = Group crawl stroke skills low and high flexibility with inclusion teaching style
P₄ = Group crawl stroke skills low and high flexibility with teaching style reciprocal
P5 = Group crawl stroke skills high and low flexibility with inclusion teaching style
P6 = Group crawl stroke skills high and low flexibility with teaching style reciprocal
P7 = Group crawl stroke skills low and low flexibility with inclusion teaching style
P8 = Group crawl stroke skills low and low flexibility with teaching style reciprocal

1. There are differences in skills butterfly stroke stroke between inclusion teaching styles and reciprocal teaching styles

Based on the results of analysis of variance (ANOVA) at significance level $\alpha = 0.05$, obtained $F_{o} = 22.692$ and $F_{t} = 3.99$. Thus $F_{o} > F_{t}$ or the results of calculations with SPSS 20 shows sig. 0.000 this case is smaller than the significance level $\alpha = 0.05$, so there is no reason to reject $H_{o}$, it can be concluded that overall, there is a real difference between teaching style with the inclusion of the results of the reciprocal teaching style butterfly stroke swimming skills. Results butterfly stroke swimming skills style after being taught using the inclusion teaching styles ($= 52.79; SD = 8.42$) better than the reciprocal teaching style ($= 47.21; SD = 9.32$). This means that the research hypothesis states that the overall results of butterfly stroke swimming skills using inclusion teaching style is better than using the reciprocal teaching style.

2. There is interaction between teaching styles, crawl stroke swimming skills and flexibility to the butterfly stroke swimming skills

Based on the results of the analysis of variance of the interaction between teaching styles, crawl stroke swimming skills and flexibility to the results of butterfly stroke swimming skills ANOVA calculations shown in the table above, that the count rates $F_{o}$ interaction (FABC) $= 4.545$ and $F = 3.99$ visible table that the function $F_{o} > F$, so there is no reason to reject $H_{o}$. The conclusion that there is an interaction between the two teaching styles, crawl
stroke swimming skills and flexibility to the butterfly stroke swimming skills. In other words, the cooperation between the teaching style (inclusion and reciprocal), crawl stroke swimming skills and flexibility to the butterfly stroke swimming skills. With significant interaction, then the next we need to learn. Further trials using the Tuckey test is intended to find out: (1) differences in the results of butterfly stroke swimming skills between inclusion teaching style with reciprocal teaching style for the group who has high skill crawl stroke and high flexibility; (2) differences in the results of butterfly stroke swimming skills between inclusion teaching style with reciprocal teaching style for the group who has skill crawl stroke low and high flexibility; (3) differences in the results of butterfly stroke swimming skills between inclusion teaching style with reciprocal teaching style for the group who has skill crawl stroke high and low flexibility; (4) differences in the results of butterfly stroke swimming skills between inclusion teaching style with reciprocal teaching style for the group who have low skills crawl stroke and low flexibility.

3. There are differences in butterfly stroke swimming skills between inclusion teaching style and of the reciprocal teaching style for students who have high crawl stroke skills and high flexibility

Inclusion teaching style gives a better effect compared with the results of the reciprocal teaching style butterfly stroke swimming skills on a group of students who have the crawl stroke skills high and high flexibility. This is proved by the results of further testing in the analysis of variance (ANOVA) using the Tuckey test. Treatment group who has high crawl stroke skill and high flexibility with the inclusion teaching style (P1) compared with the treatment group who has high crawl stroke skill and high flexibility with reciprocal teaching style (P2), obtained $Q_0 = 5.66$ and $Q_t = 2.36$. Thus $Q_0 > Q_t$, based on these data there is no reason to reject $H_0$, so it can be interpreted that there are differences in the results of butterfly
stroke swimming skills between inclusion teaching style with reciprocal teaching style for the group who has high crawl stroke skill and high flexibility. Based on calculations, the average value obtained that students who have high crawl stroke swimming skills and high flexibility by using a inclusion teaching styles (= 60.92; SD = 31.78) is better than the reciprocal teaching style (= 51.54; SD = 6.56) in the results of butterfly stroke swimming skills. Thus the research hypothesis stated that the group of students who have the crawl stroke skills high and high flexibility, inclusion teaching style is better than the results of the reciprocal teaching style butterfly stroke swimming skills proven.

4. There are differences in butterfly stroke swimming skills between inclusion teaching style and of the reciprocal teaching style for students who have low crawl stroke skills and high flexibility

Reciprocal teaching style gives a better effect than the inclusion of the results of teaching style butterfly stroke swimming skills on a group of students who have the crawl stroke skills low and high flexibility. This is proved by the results of further testing in the analysis of variance (ANOVA) using the Tuckey test. Treatment group who had low crawl stroke swimming skills and high flexibility with the inclusion style of teaching styles (P3) compared with the treatment group who had low crawl stroke swimming skills and high flexibility with reciprocal teaching style (P4), obtained Qo = 2.59 and Qt = 2.36. Thus Qo> Qt, based on these data there is no reason to reject Ho, so it can be interpreted that there are differences in the results of butterfly stroke swimming skills between inclusion teaching style with reciprocal teaching style for the group who has skill crawl stroke low and high flexibility.

Based on calculations, the average value obtained that students who have low crawl stroke skills and high flexibility by using the reciprocal teaching style (= 56.75; SD = 2.86)
better than the inclusion teaching style (= 52.45 ; SD = 4.61) in the results of butterfly stroke swimming skills. Thus the research hypothesis stated that the group of students who have low crawl stroke skills and high flexibility, the reciprocal teaching style is better than inclusion teaching style in the results of butterfly stroke swimming skills proven.

5. There are differences in butterfly stroke swimming skills between inclusion teaching style and of the reciprocal teaching style for students who have high crawl stroke skills and low flexibility

Inclusion teaching style gives a better effect compared with the results of the reciprocal teaching style butterfly stroke swimming skills on a group of students who have the crawl stroke skills high and low flexibility. This is proved by the results of further testing in the analysis of variance (ANOVA) using the Tuckey test. Treatment group who has high crawl stroke skills and low flexibility with inclusion teaching style (P5) compared with the treatment group who has high crawl stroke skills and low flexibility with reciprocal teaching style (P6), obtained $Q_o = 12.34$ and $Q_t = 2.36$. Thus $Q_o > Q_t$, based on these data there is no reason to reject $H_0$, so it can be interpreted that there are differences in the results of butterfly stroke swimming skills between inclusion teaching style with reciprocal teaching style for the group who has high crawl stroke skill and low flexibility. Based on calculations, the average value obtained that students who have high crawl stroke skills and low flexibility by using inclusion teaching style (= 56.82; SD = 4.61) better than the reciprocal teaching style (= 36.39 ; SD = 6.53) in the results of butterfly stroke swimming skills. Thus the research hypothesis stated that the group of students who have the crawl stroke skills high and low flexibility, inclusion teaching style is better than the results of the reciprocal teaching style butterfly stroke swimming skills proven.
6. There are no differences in butterfly stroke swimming skills between inclusion teaching style and of the reciprocal teaching style for students who have low crawl stroke skills and low flexibility

Reciprocal teaching style does not give a better effect than the inclusion of the results of teaching style butterfly stroke swimming skills on a group of students who have low crawl stroke skills and low flexibility. It is not proven based on the results of further tests in the analysis of variance (ANOVA) using the Tuckey test. Treatment group who have low crawl stroke skills and low flexibility with the inclusion style of teaching styles (P7) compared with the treatment group who had low crawl stroke skills and low flexibility with reciprocal teaching style (P8), obtained $Q_0 = 1.94$ and $Q_t = 2.36$. Thus $Q_0 < Q_t$, based on these data there is no reason to reject $H_0$, so it can be interpreted that there is no difference in the results of butterfly stroke swimming skills between inclusion teaching style with reciprocal teaching style for the group who have low crawl stroke skills and low flexibility. Based on calculations, the average value obtained that students who have low crawl stroke skills and low flexibility to use the reciprocal teaching style ($= 44.18; SD = 4.60$) was no better than the inclusion teaching style ($= 40.96; SD = 3.83$) in the results of butterfly stroke swimming skills. Thus the research hypothesis stated that the group of students who have low crawl stroke skills and low flexibility, reciprocal teaching style is better than teaching style inclusion in the results of butterfly stroke swimming skills is not proven.

DISCUSSION

The results of relevant research conducted by the Agung Sunarno on learning outcomes research Cucu Hidayat hurdles and learning outcomes in physical education research shows that the inclusion of more effective teaching style (better) than the practice of teaching styles. Results of research conducted data analysis using factorial ANOVA followed by Tuckey test the six hypotheses proposed research, it turns out five hypotheses verified and
verified the hypothesis is not significant. Research findings are the result of statistical data analysis that requires further study to be able to explain why there is a hypothesis that is accepted and there is no accepted hypothesis. The hypothesis is empirically proven to significantly according to the studies already existing theories. So that needs to be discussed is why there is an unproven hypothesis.

On the hypothesis that the six (6) treatment group who have low crawl stroke skills and low flexibility with inclusion teaching style compared with the treatment group who had low crawl stroke skills and low flexibility with reciprocal teaching style is not proven no significant difference. This means that the reciprocal teaching style was not better when compared to using a teaching style inclusion in the achievement of the learning skills of swimming butterfly stroke. Due to the advantages of reciprocal teaching style that helped create good cooperation among students, develop patience and tolerance, the presence of reciprocity in giving and receiving unpan behind, develop the ability to provide accurate feedback, the development of respect for the honesty of the observer, the process runs in continuity running continue to learn and train someone will accelerate tasks provide feedback to their partner. Thus the students are more focused, productive and not waste time to connect movement after class section by section. But empirically, the average difference in the two styles of teaching is not significant (not significant), this can be caused by crawl stroke mastery level low and low flexibility makes learning delays swimming butterfly stroke. Despite these weaknesses in trying to minimize the use of excess reciprocal teaching style. And the dependence of students on the presence of such a large figure of faculty teaching courses in swimming, as if it is something that is not replaceable. This resulted in students lack sufficient confidence in the decision to learn the material and then the next would membutuhukan allocation of time and more repetition. Linkages with relevant research results
indicate that the inclusion teaching style gives better results in the learning process, especially about learning motion (sports).

In this research has been pursued to the fullest according to the ability of the author, but in research there are still some limitations, among other limitations; 1) limited population, 2) the sample is derived from FIK Unimed student who is still active in college, both theoretical subjects and practical subjects, so that physical activity can not be controlled, 3) there are still people who are not serious sample, 4) samples sons, 5) presence of psychological factors thought to influence the outcome, 6) any other alleged physical factors can not be controlled.

CONCLUSION

The results of this study concluded that there are 5 proven hypotheses and 1 hypothesis that there is no empirically proven. The hypothesis was proven hypothesis to 1 Overall inclusion teaching style is better than the reciprocal teaching style butterfly stroke swimming skills, hypothesis 2 There is interaction between teaching styles, crawl stroke swimming skills and flexibility to the butterfly stroke swimming skills, the hypothesis 3 to inclusion teaching style is better than the reciprocal teaching style butterfly stroke swimming skills for students who have high skills crawl stroke and high flexibility, hypothesis 4 reciprocal teaching style is better than teaching styles inclusion to the butterfly stroke swimming skills for students who have low skills crawl stroke and high flexibility, hypothesis 5 to inclusion teaching style is better than the reciprocal teaching style butterfly stroke swimming skills for students who have the skills crawl stroke high and low flexibility. Unproven hypothesis is a hypothesis to 6 reciprocal style of teaching is no better than the inclusion style of teaching butterfly stroke swimming skills for students who have low style swimming skills and low flexibility.
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CHARACTER BUILDING THROUGH SPORTS TOURISM

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ABSTRACT
Sport as physical activity is also believed to be an effective means of character building. The problem of character is currently a hot issue in Indonesia. Indonesia as a country rich in cultural heritage and natural capital is strong to become an influential country in the world. The problems that arise in Indonesia is less of a sense that is embedded in the soul of the young generation to compete at the International level in all areas. This paper thought the author tried to explain the role of sport tourism in the formation of national character. Sport tourism is now one of the main aspects to support the Regional and State income increase. Indonesia is a country rich in natural resources that support for the development of sports tourism. In this paper tries to reveal that one of the areas of sports tourism is very possible for the development of character is nautical sports. The characters are very likely to be developed through sports tourism, especially nautical sports are: courage, cooperation, mutual respect, and piety towards God Almighty.

Keywords: character building, sports tourism, marine sports.

A. Introduction

The human body consists of the union of the body and soul of millions of cells that coordinate to always dynamic. The development of mind and body to be balanced and in harmony. The process requires the development of mind and body that aids one through sport in other words exercise is one of the activities that can build up body and soul in balance. The benefits of exercise as a means to develop the mind and body have been recognized in international agreements that exercise is believed to be an appropriate means to shape human character. The development of the soul or
mind can be done with a lot of physical activity, one of them with a recreational sport that goes in it is sports tourism. Sports tourism is the main purpose is to make the mind becomes fresh again after doing routine activities that might be boring.

Old saying "a healthy body there is a strong soul" slogan has been ingrained in the human life system in the world. Reflecting the adage that, the underlying belief that exercise is helpful in every line of human life, fitness is the key word to be able to work.

Role and benefits of exercise in the development and formation of the human character has been recognized by the international community. Sports as an inseparable part of one's primary kebututuhan. Sports, as said Richard Scaht (1998: 124 in pramono), exercise as well as sex, is too important to be confused with other themes. It is not just about exercise for the sake of health. Not just a game for entertainment, or spending free time, or to a combination of social and recreational purpose. Sport is an activity that has a very natural ontological roots of existence, which can be observed as a baby in the womb up to the trained movement forms. in the process of development of the sport itself. Human beings are the most perfect human creation has a soul and body are interlocked and must be balanced.

Belief in the importance of sport in developing both aspects it's been a great moment. One that could be developed is the ability of the brain. The human brain is the controller of all activities. The brain is composed of left and right brain. The left brain is associated with the ability of IQ, while the right brain is associated with EQ.

Development of sports fields in an effort to help develop the mindset and character of human beings can not just bits and pieces. Field study of sport science, especially in Indonesia is still very young, given the recognition of sport as a science newly recognized independent in 2000, after a moment known as the declaration
surabaya 1998 this young age it is necessary efforts to further develop this sports field.

According to the Commission for Discipline sport (2000)-dimensional field theory which underlies established in the field of pursuits are: sport philosophy, sport history, sport pedadogi, sports psychology, sports sociology, sports biomechanics, sports medicine. In addition to the seven areas of the theory developed another theory that is specific, namely: study of motion, motor development, play theory, the theory of motion, the theory of practice. While science is currently undergoing development: sport management, sport infrastructures, sports industry, communications and sports media, sports economics, sports law, sports politics. Of all the existing science disilpin, today must begin to develop sports tourism based. Sports tourism was developed and is believed to be indispensable in the business development of sport science. The economic aspect is very big influence in the development of sports tourism.

According to Law No. 3 Th 2005 on the Sistem Keolahragaan Nasional include studies of existing sports fields of study, namely: sport education, sport and recreational sport achievements, in studies one needs to study the development of sports tourism as long as possible in the recreational sports, sports tourism at the present time has a very strategic role both for the perpetrator and the perpetrator of the business.

Role in the development of sports tourism mindset and character building is very large. One of the sports tourism is able to develop the mind and character is the marine sports. Very marine sports require mental aspect and if done properly can refresh mentally, in other words "originated from the mental and end up in a mental"
Marine sports in general is a challenging sport and requires technique and courage than other sports. In the implementation is in need of courage, daring and just people who have the right skills who are able to perform this exercise.

B. Discussion

Human superiority compared with other beings is the union of body and soul in one unified whole. Human beings are God's most perfect creation. To develop two aspects of the human self is a sport. Sport science as a discipline is still young, therefore it is necessary to develop studies for the development of deeper sport science. Studies that might extend it a try discussed are sports and mind through sports tourism.

1. Definition of Sport Tourism

The development of Indonesian tourism industry has been good today. Indonesia which consists of thousands of islands is a country rich in diverse tourist attractions. Among other cultural tourism, religious tourism, arts, and special interest tours with the sports tourism, especially in the open. Tourist attractions such as nature tourism, especially nautical tourism, mountain tourism, tourist rivers and lakes and jungle tours. The development of tourism in Indonesia should take advantage of Indonesia's natural capital as a base. Changes in lifestyle and human needs will certainly affect the interest traveled. Along with the improvement of lifestyle, then the purpose of the traveled at the present time has been very diverse. The existence of new activity traveled a highly anticipated by most tourists. Changes in the level of human lifestyles affect the activities outside the daily routine or the need for entertainment is to be increased traveled.
As one of the leading sectors and excellent national development, tourism should continue to improve the search for new breakthroughs are very supportive of tourism itself. Environmentally sustainable tourism development or the so-called ecotourism should be encouraged in Indonesia, including in Bali which is a major tourist destination in Indonesia.

Today tourist arrivals coming in tourist destinations are eager to promote physical activity in a tourist destination, so extracting natural resources still refers to the conservation of nature in the area of tourism destination is very helpful in the development of tourism. Development of a very precise nature developed in the country of Indonesia, according Fandeli (2001: 137) nature is very suitable to be developed in Indonesia because our country is very rich in natural resources (forests, mountains, sea, rivers, lakes and caves) as a potential resource for natural attractions. Nature tourism development if properly managed will also affect tourists stay longer in tourist destinations.

As one of the tourist destinations, Indonesia is still a lot of saving natural resources need to be developed. Development of a tourist destination or a new type of tourist in Indonesia is something that should be implemented immediately, because the Indonesian tourist attraction at this present moment in general is the culture and customs of the people of Indonesia was still keeping the heritage of the ancestors. Natural role as a natural resource in tourism is very big and important (Fandeli 2001: 15)

One of the things that need to be developed is a kind of nature tourism, eco-tourism which invites tourists to visit a place that has a mesmerizing scenic or natural beauty, activities such as rafting down the river or (rafting), mountain climbing and creeping forest, cycling, diving, surfing.
Modern human activity is not sufficient to exercise performed with fitness goals alone but olaharga aimed at recreation very rapid development. At the time of exercise is needed tourism and managers the ability of actors to be packed properly. According Fandeli (1995: 146) Travel through exercise is a sensation that if these challenges can end up with success. In an effort to sporting activities carried out in the open was key safety factors that must be considered by the perpetrators and organizers.

Outdoor sports activities at the present time is one commodity has tourism travelers who are able to make a longer stay in a tourist destination. Sports activities are conducted in a tourist area can not be equated with the sole area. , This is caused by natural conditions and different physiographic (Fandeli 1995: 148). The structure of sport activity which aims to traveled continues to change. According to Smith, quoted by Fandeli (1995: 148) Tracking and cycling is at the top. Development of sports tourism if developed in Indonesia has tremendous opportunity, this is because the potential of tourism can be developed relatively unbounded for the tropics islands. The reason is the industrialization development of sports tourism. Characteristic parts of Indonesia which consists of thousands of islands it is possible to develop sports tourism in accordance with the characteristics of existing areas.

Indonesia, especially Indonesia, which consists of mountains, sea and plains it is possible to develop sports tourism types. Today the arrival of the tourists who visit a tourist destination not only enjoy nature and culture exist, but travelers will want to do physical activity (exercise). Ecosystem diversity in tropical forests that are found in almost 18,000 islands in Indonesia, is very promising for ecotourism and special interest (fadeli in www. Rakyat.com Mind).

Tourists from Europe during a visit in Indonesia in general want to enjoy the
kind of special interest tours such as beach (marine) and natural adventure, which is widely spread in various tourist destinations in the country. Our potential to sell products of special interest is very large. However, the problems we face to provide in-depth information about products that are still lacking (www.budpar.go.id)

2. Benefits of Sports Tourism for the Character Building

Sport Science is divided from several studies provide a broad space for development, development of sport science requires a deep study. The field is a sport that is beginning to attract tourism. Sports tourism if properly managed in addition to increase foreign exchange, can also help the government's efforts to develop cognitive and mental development.

Sports tourism is generally carried open in nature requires a lot of physical activity and a healthy mindset and high courage. Sports tourism is done with no compulsion to seek fitness and mental satisfaction.

Development of sport as a way to develop the mindset and mental sometimes still considered wind. It is actually being able to explain that the child can make love and do sports require a long time. This growing phenomenon of adult children at school age are developments in primary schools have been hit gadget syndrome (HP, laptop and other electronic games), unfavorable impact on the development of children's thought patterns and mental.

The process of recognition and stimulation for the love of sports is the sports tourism. Sport tourism as an attempt of developing a true sports field excellent vehicle that can be used by parents to encourage children to love the sport. Sports tourism is generally done in a tourist destination that has a double meaning as a vehicle for the development of cognitive and also mental aspects of the perpetrators.
3. Development Mind and Character Building of Sport Tourism

Cognitive and mental aspects began to decline a challenge faced by society in general. Sport tourism as part of a science keolahragaan should be able to help solve this problem.

Development of sports tourism activities in mind in an attempt to help improve cognitive and mental aspects, among others: physical activity digalakkannya place tourist destination. Many things can be done in a tourist destination, for example out bond, surfing, rafting and water sport activities (Marine) . Water sport as one exercise done daopat tourist destination. Water sport is a sport that can develop kesaimbangan between mind, technique and mental, not everyone is able to carry out water sport activities.

Water sport as one that can be developed in almost all regions of Indonesia, because Indonesia is a maritime country that most of its territory is sea. The existence of this region which is the basic capital in the development of water sports.

The development of water sports as sport to develop the mindset and mental aspects should pay attention to other aspects. Implementation of this activity is the main culprit is the attention to safety. For example dalampelaksanaan diving or menyelam.hal to do first dahuluadalah theoretical understanding of the correct use of tools, equipment in the sport of diving is a vital tool in avoiding fatal incident, keduan thing is the ability to understand the character of the waters of the diving spot, the third is the discipline the instructor to follow instructions, the fourth is a partnership that must be done by divers (diving) in the water.

Diving is one example of a sport that has to do with discipline in accordance with the rule that has been agreed upon by the international diving organization. Diving one of the sports that are very strict in carrying out the implementation
procedures. An instructor will not serve or assist guests who have a high risk, and also when nature does not allow for diving. In the diving is in need of cooperation, communication and honesty.

C. Closing

1. Conclusions

a. Sports tourism is a part of the development of sport science
b. Many benefits can get from the sport pariwisata from the perpetrators and for the development of sport science itself
c. Indonesia is very potential to be developed sport tourism

2. Suggestion

a. Studies on pariwisata sports should be done immediately instituted an intensive academic
b. Development of sport tourism should be seen as the overall development of sport science.
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Kompas edisi 13 Oktober 2004


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THE BUILDING OF SPORT INDUSTRIAL DEVELOPMENT BASED ON
SPORT ACTIVITY MANAGEMENT REGULATORY APPROACH

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Fifukha Dwi Khory

Abstract

Industry event is one of the largest marketing the world and gives big
contribution to the positive economic development. Sport is also designed as a global-
scale modern industry. In building national character, sports industry has become
industrial identity which has a significant added value.

The condition of the sports industry in indoensia is still small, as mentioned
above, by all means it is contrary to the current demands of the free market. Sports
industry can be divided in to two, namely sport it self and its supporters. Sport’s
Micro-industry is a collective effor to various parties to develop economic behavior
between producers and consumers that connected by sport’s good services forms of
production.

The main material of this paper focuses on the growth of sports activities for
which the basis of tourism business, recreation and sport as the main integral part of
the sports industry development and marketing strategies. Management and sports
industry management become one of the several things that are very essential in the
building and development process. Broadly speaking, there are three segments of the
sports industry, namely: 1) sport performance, 2) sport production, 3) sport
promotion.

Suggestions and recommendations that can be given from authors are related to
community participation, reflection of sports industry productivity, and stakeholders’s
policy-making patterns that related to the sports field.

Keywords: sports industry event, management, sports industry segmentation.

Introduction

Sports industry is one of the very important aspect in the economic
development of the country. In many developed and modern countries as in America,
Britain, Germany, France, Italy, Korea and China, sport has become the main industry
as a supplier of foreign exchange. Beside, sport also designed as a global-scale modern
industry. In building national character, sports industry has become the industrial identity that has significant added value. In Indonesia, the development of sports industry still requires community participation in creating sports achievers with the support of the local sports industry.

Ministry of Youth and Sports through Youth Entrepreneurship and Sports Industry Deputy as the sports industry developer institution in Indonesia has launched an idea to develop the sports industry as creative industry that highly competitive in the area of globalization. Coordination measures with various stakeholders have been taken, now the Ministry of Youth and Sports through Youth Entrepreneurship and Sports Industry Deputy try to go further in order to develop the sports industry in Indonesia. One of important steps that urgent to be implemented is conducting identification and sports industry centers development that already existed and developing various sports equipment centers that can be easily accessed by the public.

Sports in our beloved country is still faltering in achievement. It is believed due to the lack of facilities and good education programs. Indonesia’s Chamber of commerce and industry particularly sports industry development division, already see it, Indonesia must do sports industrialization as one way of tackling the problem. Also, western nation and united states interest to invest in the field of sport in Asia is the right moment to develop sports industrialization (ibn2011: 1).

Why? Through sport industrialization, sports facilities and sports events will be increased so that the quality of the athletes as well as honed. This improvement derived from sports investors.

Indescription of Law of the Republic of Indonesiano. 20 year 2008 concerning micro, small and medium bussiness, (2008: 30-31) have been described that micro, small and medium businesses is a business activity that able to expand employment and provide economic services widely to the public, and play a role in the distribution process and the improvement of household incomes, encourage economic growth and play a role in achieving national stability. Nevertheless, micro, small and medium enterprises still face a various obstacles and constraints, especially in terms of production and processing, marketing, human resources, design and technology, capital, as well as business climate.
Obstacles and constraints are of course also be felt in the sports industry businesses, who generally "play" in micro-enterprises segment. Advancement on sports micro-industry has strategic value as it relates to the economic empowerment of grassroots efforts and is part of the poverty alleviation efforts. Conducive business climate in the sports industry also an indicator that the sports construction actually has a very broad impact companion. The impact is not just limited to the sports community, but also in society at large, related with social welfare issues.

The development of sports industry, sports tourism in particular, need serious attention in order to be able to create more advanced and transformative society that is advanced society both structurally and culturally. Structural dimension is reflected in the efforts to change agrarian society in to strong industrial society which is supported on two main power namely by advanced agriculture including technology mastery and have strong competitiveness in entering the global market. While the cultural dimension is reflected in the new values that evolving and very helpful in supporting the formation of sports industry community that regarding to attitudes, community rational behaviors, health awareness, and competitive (Farida M., 2011: 2).

Sports industrialization in economic development can be seen in the framework and approach pattern which developed Masyur Wiratmo (1992) who said that the developing countries believe that industrialization is needful so that the country can grow and develop rapidly. Because in the industrialization process, usually accompanied by accelerated advances in technology, human resources training process and then an increase in productivity, (there by also increasing real wages and income) than if you just rely on the agricultural sector.

Sports industry is defined as "all production of goods, services, places, people, and ideas that are offered to customers, related to sports. (Pitts, Fielding, and Miller, 1994). Ozanian said that "sports is not only big business". Sports is one of the fastest growing industries in America, and it is intertwined with every aspect of the economy—from media to food and clothing to sports and advertising............sports are everywhere, coupled with in cessionally ringing cash register money" (Ozanian, 1995). Industry classification: (1) agriculture, forestry and advertisement; (2) the mining industry; (3) manufacturing industrial; (4) construction industry; (5) transportation industrial, communication; (6) industry trade(trade); (7) finance industrial; (8)
services industrial(service); (9) industrial government (encyclopedia Americana, 1975).

In line with the increase in the pace of the industry, the value of production continued to increase. The improvement in the value of production is made possible by an increase in the competitiveness of industrial products sport. Improved competitiveness of course accompanied by an improvement in purchasing power and achievement through sports industry products, especially in penetrating the international market.

To penetrate these markets need new break throughs. And to stimulate the tourists in the self-development, and facing free trade era, the Local Government is expected as a motivator for providing various facilities. The government can provide ease of administration and the policies that can directly support the development of the sports industry.

Sports Industry?

According to Pitts; Fielding, and Miller (1994) sports industry is "any products, goods, services, places, and people with ideas that offered to the public associated with the sport. Quoted from Nuryadi’s statement (2010: 10); Sport Industry is an industry that creates added value by produce and supplying sports-related equipment and services. Sport marketing is a specific application of marketing principles and marketing processes to sports products and to market their sports non-profit products as associated through association with sport.

If we observe the profile of the sport industry business in Indonesia, they are in the operations facing main problems:

1. Capital Problem. For the capital problem, entrepreneurs in running their business not familiar with utilizing banking institutions. Besides, the sports industry business man (in small sector) is difficult to obtain credit from private banks.
2. Weak in gaining market opportunities and increase market share. Generally sports industry gain market in passive ways. They rely on the power of promotional person selling namely the inter-personal communication.
3. Limitations on utilization of technology. This is due to the lack of human resources to absorb science and technology.

4. Problem of product marketing strategy is one of the major obstacles for small sports industry to enter free market. Of ten a small industrial sports in products marketing have to go through the chain.

5. Weak in business networks and business cooperation.

6. Weaknesses in the business and entrepreneurial mentality. Generally, the small sports industry only few who have the creativity and innovation, also independence and passion for progress.

   The condition of small the sports industry, as mentioned above of course is contrary to the current demands of the freemarket. The free market demanding sport industry even small must be strong, independent, dynamic, efficient, and capable to give qualified products and outstanding service. To improve the profile of the sport industry in Indonesia with a variety of problems and weaknesses then will need empowerment process of the sports industry. Empowerment must be directly touched sixth draw backs above.

**Pattern of Sports Industry Development**

Before we move to talk about the case above, it will helps us to look at following three patterns that related to the sports industry development: a) in Indonesia there is the potential for sports people and great various scope/dimensions of sports. This is one of the government programs success to promote sports, b) there are three areas, namely education sports, recreation sports and achievement sports, and c) the magnitude of the growth opportunities in the field of sports industry. From three are a mentioned above, sport industry able to penetrate various market segments.

Besides selecting and doing a variety of approaches to business success in the sport, it would also need to build a good communication with the various parties. With communication we able to solving a conflict, sowe will get a higher quality solution concept, although there will be a change, but these changes lead to a better condition and give effect to collective progress.
The sports industry has the following characteristics:

1. Constantly attention on business.
2. Part or branch of business.
3. Something which employs much labor and capital, which is there all activity of the trade (Webster's New Collegiate Dictionary)

Segments of the sports industry in accordance with the type of products according to Parks, Zanger and Ouarterman, (1998) there are three segments, namely:

Sport performance /sports appearances, this segment have wide - range of products. Such as school sports, fitness clubs, sports camps, sports professionals, and city sports park.

a. Sport Production/sports production, this sport’s production segment can be given examples such as basketball, tennis, sport shoes, swimming pools, as well as other sports equipment,

b. Sport Promotion/Promotion Sports. This segment can be a merchandise such as t-shirts, or shirts with the logo, print and electronic media, sports marketing a gencies, sports event organizers.

**Sport Development Systems Strengthening**

1. Sports development is directed to:
   a. Develop policies and preparation management and planning of sports programs in the efforts of realizing a development system and sports development in an integrated and sustainable ways;
   b. Increasing access and community participation more broadly and evenly to promote health, physical fitness and build character of the nation, as well as building cultural conception of sport in the community;
   c. Improve sports facilities and infrastructure are already available to support the development of sport;
   d. Increasing seeding efforts and development of sports achievement systematically, hierarchically and sustainable;
   e. Enhance partnership pattern and entrepreneurship in an effort to explore the potential of the sport economy through the development of the sports industry;
f. Develop ward system and improve the well-being of athletes, coaches, and personnel in sports.

2. The purpose of sport development system strengthening program to realize the harmony of the sports policy. The main activities that applied:

   a. Mapping and data collection of potential districts/cities in Indonesia;
   b. Studying development policies in the field of sports;
   c. Developing partnerships community with government in the development of sports;
   d. Monitoring and evaluation of sports development implementation.

**Sports Industry Development Strategy**

In the development of sports industry in Indonesia, it would need to re-orientation the program, some of these are as follows:

1. The development of sports culture

   Sports Culture is a major corner stone in the development of national sport. Sports culture is the community attitude and habits to enjoy sport as exercise and a healthy lifestyle. The development sport cultural can be started from the scope of individuals and families by providing an appreciation to the meaning and the benefits of exercise for improving health and quality of life.

2. Regional and international sports competition

   National achievement on sport continues to decline at regional and international levels. This condition is caused by the lack of competitiveness of the national sport compared to other countries. The awakening of new power in sports, both at the level of ASEAN, Asia, and the world affects the position of the power of sport in Indonesia. The development of sport in Thailand, Malaysia, China, and some former Soviet republics are the forces that influence decisions of sports coaching in general in Indonesia.

3. National sports management

   Integrative approach in determining policies that allow national sports development running harmoniously, integrated and sustainable that supported by
financing system with a adequacy and sustainability principles is very important in supporting the successful development of the sport.

4. Sports infrastructure and the application of research, science and technology

   The application of Science in sports development both to improve the quality of teaching and learning process and training is a necessity. Quality process ensures the achievement of learning outcomes and sport achievement targeted. It's hard to imagine a learning achieve mentor high achievement without the use of science and technology. Technology support is available including teaching laboratory facilities and sports training are indispensable in improving achievement. For example, the success of sport achievements of other countries such as Australia and China are because of this problem.

5. Synchronization programs between; government, public, and private

   Sports policies taken by the government was necessary and still dominant for a smooth process in the field, such as financing sport subsidies. Public and private parties as executor in the field, will hide behind the government's policy decisions, so in practice, public or private parties can work quietly and safe. Third-party or markets, or obliged to popularize or to promote sport in the community, so that not only sport sector as a non profit sector but also profit and can be sold to the public.

6. Banking Role in the Development of Sports Industry

   In terms of development, bank is actually able to contribute, where as some of which has its own health club. For example, Bank BNI and Bank of South Sumatra in volleyball, as well as actively participate in the competition and recruit talented athletes. It is desirable, banks not only act as a sponsor of an event or a club that is usually meant as well as promotional efforts, but can go more deeply. Sports industry can be divided in to two, namely sports itself and its supporters. Sports can be an event or a branch, while quite a lot of supporters. Some of supporter’s factors including the mass media, both electronic and print; sports equipment, advertising, are narental services, paraphernalia or merchandise, and much more. The number of banks operating in the country at present is about 120 it is desirable they will perform their role in accordance with
ability, so that we are optimistic that the national sporting world will bere-excited (Suara Merdeka online 29-9-2012).

As a Sports Tourism Event

Tourism events can become an integral and major part of the tourism development and marketing strategies. Tourism event can be used to describe a social phenomenon and this can be interpreted as "the systematic development, planning, marketing and become a historical flashback of the past". The purpose of tourism events can be:

a. To create a favorable image of the tourist destination in the region or country in question.

b. To expand the culture and local traditions information.

c. To spread more evenly tourist demand in an area.

d. To attract foreign and domestic visitors.

Statistics show, for example; that in the event segment of the exhibition sector can improve a strong international presence between 15% and 20%. It is very helpful to other tourism sectors such as hotel and transportation. Many official delegations from various countries and then add other activities like a mini vacation to a business trip (Sunday Times, 28/2/1999: 16). The event may be the most common channel where visitors meet their desire to taste the local food and traditions, participate in the game, or will be entertained. Local and regional events can have additional advantages to maintaining an active market domestic tourism (Getz, 1991:67). Even tourists or visitors can be defined as those who are traveling away from home for business, pleasure, personal business or other purposes (except forround-trip due to work) and staying on the goal event (Masberg, 1998: 67).

1. Real Products

Event scan be explained with reference to their real component. Getz(1991: 123) proposes that the real product of an event that actually presented to the publicas a façade: This is a mechanism that is created as part of the visitor’s experience. There is a synergistic process involving tangible
products and a lot of forms to create an atmosphere that makes the event. Furthermore, the event is usually created as a means to achieve some larger goal. Even in the case where the event has not been planned in mind with the purpose of tourism, it tends to be a strategic factor after the manager aims to market, promote or event package as part of the appeal of the destination.

2. Social Relationships

A powerful social connector, sport can bring people together, expand and strengthen socialties and networks, the links to resources and provide them with a sense of belonging. Social relation are the basic determinants of health, but often lacking for people who are marginalized by poverty, discrimination, disease, or conflict. Sports can also be used to reduce the social stigma experienced by marginalized groups, such as people with disabilities, people with HIV and AIDS, and child ex-combatants. By engaging these people in sports activities with other community members, sports create shared spaces and experiences that help break down negative perceptions and allows people to focus on what they have in common. This is an important step in improving individuals' self-concept and emotional health (R. Dodd and A. Cassels, 2006:379-387).

3. Sport as a platform for mobilizing communication, education and social

Sports can play a valuable role as communications, education and social mobilization vehicle. The entertainment sports, reinforced by global telecommunications, has made it one of the most powerful communications plat for min the world. By involving and mobilizing elite athletes and high profile professional sports clubs and federations, this power of communication can be used to provide critical health information and messages, to model healthy lifestyle behaviors, and to gather resources for health initiatives. At the community level, a popular sports event offers local plat form to provide health information an deducation, and can serve as a starting point for community mobilization to support the promotion of health, vaccinations, and disease prevention and control efforts (Williams, 2006).
4. Organizing sporting events

To hold as ports event, sports events manager must be able to effectively plan the event and can ensure and facilitate the involvement and participation of all the elements involved. Besides, he must coordinate the entire process before the actual event and post-event also understand the needs of the customer, ensuring that the event attracted players and audience as well as what they need so that can meet the needs of sponsors.

Sport event manager should be able to ensure that the event is organized in a manner such that it meets the requirements of the game, players, spectators and sponsors, so make sure that they are all looking forward to the next game. Finally, it should be able to continue to monitor and evaluate the program and make adjustments as needed to solve problems in the organization of the event.

A management team must have quality to the success of a sports event with some criteria as follows:

a. Thorough attention to detail is very important.
b. Creative and innovative-open to change.
c. Energetic and enthusiastic.
d. Diplomatic but also persuasive and powerful.
e. Diligent, committed and hard working.
f. A positive attitude can do and necessary at any time.
g. Preferably experience in sports event management.

Regardless of size, all events require a high level of planning, a variety of skills and a lot of energy (Parks & Recreation New Zealand, 2002:2). A careful and detailed planning is essential to avoid or resolve potential problems.

Sports event manager must be absolutely sure that he is able to organize a specific event in mind, before the start of the event held. He must accustomed to set up the game-for example, league from week to week, or special events-for example; a tournament one day or for a week. At the local level, these events are usually organized to generate funds, market teams or
clubs, and or to create community involvement. At the national or international level, these events usually planned to meet the requirements of the same type but for more professional reasons. The event has become big business, so the value of the event from sponsor's perspective is become more important.

**Direction and Sports Industry Development Priorities**

**Focus on Micro Sport Industry**

Some of the categories are the focus of the development of micro sports industry include:

1. **Products clothing and sporting goods**

   Creative sports wear product development and sports equipment of various educational, recreational sports and sports achievements of national and international standards. Clothing and sports equipment is to meet the needs of education, training camp athletes, sports clubs, community needs, the needs of the local market, domestic, and international.

2. **Sports championship events**

   Develop various sports championship events in the category of “Olympic Games”, various championships/competitions, and festivals including recreational sports community sports and traditional sports, extreme sports, including adventure sports, which is integrated in arts degree, traditional culture, contemporary art, natural resources, and promotion of tourism.

3. **Marketing the sports industry**

   Development sports consultancy, growing sports clubs, growing sports information and communication media, spurring activity promotion, and marketing in the sports industry at home and abroad.

4. **Increase the capacity of sports industry capability**

   From an economic perspective, the development of sports industry directed to accelerate the reduction of unemployment, open job opportunities and business opportunities for young entrepreneurs in rural and urban areas.
Industrial Micro Sport and Job Fair

Micro Sports Industry is a collective effort of various parties to develop economic behavior between producers and consumers to be bridged through the forms of production of sports goods or services. Economic behavior has the potential for poverty alleviation and unemployment reduction.

Quoted from an article written by Kristiyanto (2011: 10); the profile of sporting goods and or services industry which surveyed include the industries in West Java, Central Java, and East Java. Cities surveyed included: Majalengka, Solo, Sukoharjo, Karanganyar, Nganjuk, Madiun and Ponorogo. The number of surveyed in West Java is one industry that employs 100 people; in Central Java, as many ten sports goods industry and services which employ some 92 people; in East Java six industrial clothing and sports equipment that employs 102 people.

The composition of workers in the sport industrial sector are: in West Java, covering 58 percent of male workers and 42 percent of female workers; in Central Java, 75 percent of male workers and 25 percent of female workers; and in East Java, male workers 62.7 percent and 37.3 percent female workers.

Worker’s income in services and goods industry of sports in West Java, Central Java, and East Java mostly ranged IDR 500,000-up to 1,000,000, - per month with family burden average as many three men. With such facts, it can be understood that in reality work in the industrial sector cannot promise, moreover, many home workers on the payroll of the sports industry under IDR 500,000, - per month. So, factually, the sports industry just provides side work for some people, but not affect the significance for poverty alleviation and unemployment reduction.

Conclusion

1. Sports industry is"any products, goods, services, places, people with ideas are offered to the public associated with the sport.

2. Some problems of the sports industry; 1) The problem of capital, 2) Weak in gaining market opportunities and increase market share, 3) Limitations to utilize and mastery of technology. 4) The problem of product marketing strategy is one of the major obstacles for small sports industry to enter the free market, 5) Weak in business networks and business cooperation.

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3. There are three segments of the sports industry, namely: 1) Sport performance, 2) Sport Production, 3) Sport Promotion.

4. Re-orientation program sports industry strategy:
   a. The development of sports culture.
   b. Regional and international sports competition.
   c. Management's national sport.
   d. Sports infrastructure and the application of research and science and technology.
   e. Synchronization between programs; government, public, and private.
   f. The role of banks in the development of the sports industry.

5. The growth of sports activities for which the basis of tourism business, recreation and sport as an integral part of the main tourism development and marketing strategies. The growth of tourism depends on a big event and management knowledge quality as well as executive managers. A sports event manager should have a complete training in the tourism sector as well as in the sports sector, in order to meet customer needs.

6. The focus of Micro sports industry development, are as follow:
   a. Sports clothing and goods.
   b. Sports championship events.
   c. Sports industry marketing.
   d. Increasing the capacity of sport industry business man.

7. From there search that has been conducted; sports industry factually only provides sidework for some people, but it has not impacted significantly to the alleviation of poverty and unemployment reduction.

**Suggestions and Recommendations**

Following are several suggestions and recommendations that author can provide:

1. Regular participation in sport and physical activity contribute to the formation of strong family and support each other as well as good neighborliness. Such contributions, like a healthy chance, self-confident, educated, and productive, and safe communities and supporting each other is needed in the complex world, rapidly changing and interdependent with each other.
2. We should reflect on some of the developed countries where high sports industry productivity impact to the achieving of life quality that is characterized by an improvement in leisure time sports participation and health that causes rapid increase in the growth of health club with business orientation of the sports industry.

3. Appropriate, wise, and thoughtful policies of the stakeholder on sport field is necessary, because the main purpose of a policy is to provide a demand for action deemed appropriate. Policies developed to prevent confusion and give assurance to meet the various interests of citizens, especially on sports management and sports industries. With appropriate policy, interest-conflict can be reduced.
Reference


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EFFECT OF MOTIVATIONAL CLIMATE ON INTRINSIC MOTIVATION, SELF DISCIPLINE AND STUDENT MOTOR SKILL IN LEARNING PHYSICAL EDUCATION, SPORT AND HEALTH

Anung Priambodo, S. Pd, M. Psi.T

ABSTRACT

Changes a person's behavior is always based on a particular motivation. Motivation can come from within (intrinsic) and external (extrinsic). Motivation and self-discipline is a significant predictive factor in the success of achievement (Waschull, S. B, 2005). In general, there are two learning climate (motivational climate) created by the teacher-oriented tasks (task involvement) and ego-oriented (ego involvement). During this time, physical education lessons use competition and the comparative approach among students in assessing student competence. This condition is closer to the ego-oriented climate. For students who do not have excess or interest in motor activity (exercise), these conditions have a negative impact in the form of anxiety, decrease in self-confidence, interest in exercising etc. Task-oriented learning (task involvement) contains the elements of the award to the individual according to his ability, individuals are given a choice in the material and has different targets in learning. The purpose of this research is to see whether the task-oriented learning (task involvement) will affect intrinsic motivation, self-discipline and students outcome of motor learning in physical education lessons.

This study examined the influence of motivational climate on intrinsic motivation, self-discipline and students motor skills in physical education, sport and health. This experimental study use pre-and posttest design quasi experimental design. Amount of study subjects were 65 students divided into two groups: an experimental group of 32 students with a task-oriented motivational climate and the 33 students with a control group of ego-oriented motivational climate.

Based on the results of statistical tests with manova and t test, prove that: (1) task-oriented motivational climate increase the intrinsic motivation of students (2) task-oriented motivational climate improve students' self-discipline (3) task-oriented motivational climate does not improve motor skills of students (4) motivational climate affect intrinsic motivation,
self-discipline and motor skills of students. For the control group with the ego-oriented motivational climate that does not increase intrinsic motivation and self-discipline of students.

**Keywords:** motivational climate, task orientation, intrinsic motivation, self-discipline, motor skills, physical education

### Physical Education in Indonesia

Physical education is an integral part of the education system as a whole, which is focused on the development aspects of physical fitness, motor skills, critical thinking skills, emotional stability, social skills, reasoning and moral action through physical activity (Puskur, Ministry of Education, 2003).

Low level of physical fitness in schools of all degree of education shows that the quality of physical education programs in Indonesia is still poor. From the survey results from Depdiknas Physical Freshness Center, obtained information that physical education only able to give the effect of an increase in physical fitness of approximately 15% of the total student population. While a simple search through Sport Search found that the physical fitness of students on average in Indonesia only reached the category of "low" (MONE, 2007). The low quality of physical education teaching can also be inferred from the public complaints about the low quality of the early age sportsman. This complaint related to two things: the lack of motor skills of students is speed, agility, coordination, balance and spatial awareness, as well as the two deficiencies in terms of physical ability that is common endurance, strength, flexibility, power and local muscular endurance.

In addition to physical aspects, a lot of values which can be taught through physical education and sport. For example, related to the value of equality and solidarity, fair play, competition, all of which tolerance is a basic prerequisite to realize the civil society. Has become a common belief that sports activities requirements with values such as honesty, sportsmanship, discipline, and leadership. In fact there is a saying that has become a conviction history from time to time: Sport builds character (infallible, 2005)

In practice physical education learning more focused on mastering skills in a competitive sport, but less directed to the acquisition of values that build character. Without realizing it, the physical education teachers often show physical education learning situations
as hard exercises, using language that is command with loud voices and assertive as well as penalties if students are not able to perform a movement skill. This course will be detract from the fun in learning (enjoyment) and for students who are not able to exercise (low perceived competence), then the situation will only lead to anxiety. To overcome anxiety, often students will perform a variety ways so that he was able to overcome his ego, for example by stating many reasons for not participating physical education learning, avoiding various activities, and commit fraud to complete the task that he feels are not capable.

**Motivation as a Physical Education Learning Outcomes**

Various theories about behavior in general describes the two main base one's behavior is behavior based on biological needs for survival and behavior to obtain rewards or avoid punishment (Sansone&Harackiewicz, 2000). According to Santrock (2009) motivation involves a process that energizes, directs and maintains behavior. Psychologists define motivation as the individual processes within an active, encouraging, giving directions, and maintain behavior at all times.

Motivation can be divided into primary and secondary motivation, may also be on the biological and social motivation. Singgih opinion (2004: 50) motivation can be divided into two types, namely:

1. **Intrinsic motivation**

   Intrinsic motivation is a strong impulse or will that comes from inside. The stronger intrinsic motivation is owned by a person more likely to show robust behavior to achieve a goal (Singgih.dkk, 2004: 50). Intrinsic motivation can arise as a character or characteristic that has been around or owned since he was born. However, it does not mean a teacher can not form the intrinsic motivation in students. Teachers can do this by giving compliments or comments focused on the achievement of student competencies, without comparing it to others.

2. **Extrinsic Motivation**

   something else (a way to achieve the goal). Usually influenced by external incentives such as rewards and punishments.
Given the motivation is the driving force in the action, so if there are students who lack intrinsic motivation, needed encouragement from outside, i.e extrinsic motivation, so that students are motivated to learn. Here required the utilization of other forms of motivation accurately and wisely. Furthermore, the expected provision of appropriate external stimuli can bring satisfaction and enjoyment, giving rise to intrinsic motivation in students.

Learning is a required thing for everyone. Learning is actually fun, however, there are always obstacles that make a person reluctant to learn. Some of the elements that affect student motivation, among others: 1) the ideals or aspirations of students, 2) the ability of the student, 3) physical and spiritual conditions, 4) social environment and society, 5) Dynamic elements in learning and teaching.

Formation of intrinsic motivation

In addition to the two main basic behavior is the behavior of a person to maintain the life and behavior to obtain rewards or avoid punishment, various studies have found the existence of behavior that is motivated not by both fundamentals, but "something else" that seems to be associated with positive feelings and interests, pleasure and satisfaction (Sansone & Harackiewicz, 2000). This motivation is further known as intrinsic motivation. When someone is involved in an activity for its own interests freely, then the behavior is intrinsically motivated.

Real reward (tangible rewards) as a gift, prize money, trophies and so on can be useful in changing the behavior. However, various studies show that the reward may decrease intrinsic motivation (Ryan & Deci, 2000). In one study, students who already have a strong interest in art and was not expecting the reward, spend more time to draw than students who also have a strong interest in art, but knowing that they will be rewarded for drawing (Lepper, Greene and Nisbett in Santrock, 2009).

According to the theory of Cognitive Evaluation Theory (CET), which is expressed by Deci and Ryan (2000) intrinsic motivation can be enhanced when a person experiences an event or activity that supports autonomy or competence, otherwise events that negatively affect a person's autonomy or competence will decrease intrinsic motivation. Reward that conveys information about a student's ability to master the material can increase intrinsic motivation and increase their sense of competence (Reeve in Santrock, 2009). However, negative
feedback, such as criticism, which carries the information that incompetent students can weaken intrinsic motivation, especially if students doubt their competence (Stipek in Santrock, 2009). Based on self-determination theory, the student would like to believe that they are doing something on their own free will, not because of the success or external rewards. The researchers found that internal motivation and students’ intrinsic interest in school work increases when students have a number of options and the opportunity to assume personal responsibility for learning. Self-determination theory emphasizes the degree to which an individual's behavior is determined by motivation and self-determination (Ryan & Deci, 2000). Broadly speaking, self-determination theory identified three basic needs that if met will result in the optimal growth autonomy, relationships (Relatedness), and competence.

**Self-Discipline in Learning**

Wayson in Rogus (2001) defines self-discipline is the ability and willingness to do what should be done as long as it is needed and to learn of the results is done by others. Duckworth and Seligman, (2006) used the term self-discipline and self-control in turn, and define both as the ability to suppress responses in themselves to achieve higher goals and further specify that such a choice is not automatic but rather requires a conscious effort. Self-discipline is a person's ability to control impulses, emotions, desires and behavior. So is the ability to derive pleasure or gratification in order to achieve more meaningful purpose (http://www.essentiallifeskills.net/self-discipline.html, dated 23-9-2011 access). Furthermore Fannin, J, (2005) defines self-discipline as a willingness and commitment to continue with the tasks to achieve the goals that have been set up to lead to vision.

In the theory of educational psychology, discipline can be referenced from several theories related to self-determination and self-regulation. According to Cobb (2003), the term self-regulation can be identified with the term self-control, self-discipline, and self-directed. Self-discipline does not come by itself, but through the process of internalization of control that comes from outside (external control). Beyond the control, this could have come from a home environment (parents and community) or the school (teachers and other learning environments). At school self-discipline can be formed through a combination of good learning and democratic method (Pepper & Henry, 2001) Through these combination, students are expected to abide the rules, norms and behavior boundaries both as individuals.
and as a group member.

Curwin & Mendler, (1999) stated that the disciplinary authority includes establishing rules and consequences that are created in the classroom with each other to define, establish specific boundaries in environment which free from fear and threats. According to him, the factors that affect the discipline is determined by factors outside of school and in school. Factors outside the school including violence in society, media influence, and uncomfortable family environment, while the factors in the school that is boredom, helplessness, learning rules that are not clear, the lack of acceptance of the student, and the attack on the authority of the student.

Motivational Climate

Motivating learning environment (motivational climate) is a term that is raised by Ames (1992) is related to the perception of the learning environment created by teachers or sports coaches that can affect achievement goal orientation. There are two main dimensions is a motivating learning environment in physical activity and sport that is task-oriented learning climate (task involvement / Mastery) and ego-oriented learning climate (ego involvement / performance). Students whose oriented to the task (task orientation) will direct the actions focus on effort, cooperation and control tasks as a form of self-development. While students whose oriented to the ego (ego orientation) prefer the outcome than the process. They define success by comparing its performance (performance) with others.

Students goal orientation will greatly influence their perceptions of the learning climate experienced. Students whose oriented to the ability to master the task (mastery orientation) will see an effort, cooperation and control tasks as a form of self-development. While students are ego-oriented or performance oriented (performance orientation) prefer the outcome than the process. They always use the comparison of performance with others as goal achievement. Students will allow the creation of a task-oriented intrinsic motivation to master the task well. He will perceive his competence higher than ego-oriented students. This is because the students whose task-oriented using its own criteria (self-referenced) for his achievements, while the ego-oriented students using the criteria of others (others referenced)
in perceiving his achievements. So if the ego-oriented students who feel their performance is worse than the friends in the group, he will feel like a failure and this can lead to the emergence of a variety of negative actions in learning such as cheating or plagiarizing the work of others, dishonest in doing assignments and exams, work carelessly, and easy to despair in the face of adversity. This is very different from a task-oriented student because he will experience the pleasure and satisfaction of the task completed without comparing with others’ work.

In this study, motivating learning environment will be designed by adopting a motivating learning environment component of Ames (1992) and Epstein (1988), namely that includes task, authority, reward, clustering (grouping), evaluation and time. For easy recall, this component abbreviated as TARGET (Task, Authority, Reward, Grouping, Evaluation, Time). In detail, the development of motivating learning environment in physical education will be based on these components. The following table describes the outline of the six components.
<table>
<thead>
<tr>
<th>Components</th>
<th>Ego involvement (Involving Ego)</th>
<th>Involvement Task (Task Involving)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task(T)</td>
<td>All students receive the same task</td>
<td>Students may choose a different task and set its own targets</td>
</tr>
<tr>
<td>Authority (A)</td>
<td>Instructors decide what to learn, organize and evaluate equipment</td>
<td>Students choose what is learned, are allowed to prepare their own equipment, and are encouraged to evaluate its performance alone</td>
</tr>
<tr>
<td>Rewards(R)</td>
<td>Recognition on student achievement and awards given to the superior appearance</td>
<td>Recognition is personal and rewards given to a progress</td>
</tr>
<tr>
<td>Grouping(G)</td>
<td>One group class students work on a task or grouped based on ability</td>
<td>Students work individually or in small groups. Flexible and heterogeneous grouping</td>
</tr>
<tr>
<td>Evaluation(E)</td>
<td>Evaluation of the norm or ranking. Progress determined by destination, group and level of performance</td>
<td>Evaluation is personal and self-referenced. Progress determined by destination, effort, and improvement of individual</td>
</tr>
<tr>
<td>Time(T)</td>
<td>The instructor gives a strict time limit on the students to complete the task.</td>
<td>Limit flexible task completion. Students are helped to make progress schedule.</td>
</tr>
</tbody>
</table>

**Research Objectives**

This study aims to determine the influence of motivational climate on intrinsic motivation, self-discipline and students in learning motor skills physical education, sport and health.

**Research Methods**

This research uses a type of experimental research design between groups which uses a quasi-experimental design (quasi experiments). The design has been chosen since the subject of research does not allow for a randomly selected, but group classroom learning (Creswell, 2012). This study uses a model of Pre and Posttest Design. This design is also called Nonequivalent Control Group Design (Mertens, 2010). The subjects of this study students of SMP Negeri 34 Surabaya on subjects Physical Education, Sport and Health as much as 2 class
with a number of 65 students were divided into two groups: an experimental group and a control group.

Test instruments used in this research are the student goal orientation questionnaire adapted from the Task and Ego Orientation in Sport (TEOSQ) (Zahariadis PN, & Biddle SJH, 2000), intrinsic motivation were adapted from the Sport Motivation Scale (Lug. Pelletier, Michelle Fortier, Robert J. Vallerand, Nathalie M. Briere, Kim M. Tuson and Marc R. Blais, 1995), self-discipline questionnaire and tests of students' motor skills measured by the Barrow Motor Ability Test with items without the leading long jump, ball throwing Softball, Zig-Zag Run, Throw the ball to the wall, Scamper 50 M, and Medicine Ball Throw.

Results

Normality test is performed to determine whether the data were normally distributed or not. Normality test is done by using the Kolmogorov Smirnov test with a significant correction Liliefors.

Table 2 Results of normality test of data pretest and posttest

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>STDEV</th>
<th>Kolmogorov-Smirnov Z</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrow Pre Ability Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Experiments</td>
<td>33</td>
<td>3237.85</td>
<td>1127.61</td>
<td>0.0806</td>
<td>0.0535</td>
</tr>
<tr>
<td>• Controls</td>
<td>32</td>
<td>3548.13</td>
<td>1430.485</td>
<td>1.137</td>
<td>0.0151</td>
</tr>
<tr>
<td>Barrow Ability posttest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Experiments</td>
<td>33</td>
<td>3789.97</td>
<td>1357.411</td>
<td>0.0641</td>
<td>0.0805</td>
</tr>
<tr>
<td>• Controls</td>
<td>32</td>
<td>3767.09</td>
<td>1400.199</td>
<td>0.0972</td>
<td>0.0301</td>
</tr>
<tr>
<td>Intrinsic motivation Pre Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Experiments</td>
<td>33</td>
<td>74.42</td>
<td>3.336</td>
<td>1.173</td>
<td>0.0127</td>
</tr>
<tr>
<td>• Controls</td>
<td>32</td>
<td>73.91</td>
<td>4.321</td>
<td>0.481</td>
<td>0.0975</td>
</tr>
<tr>
<td>Intrinsic Motivation Test Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the data in Table 4.5, it obtained a p-value greater than 0.05 in all variables. Thus, Ho is accepted. So it can be concluded that the data pretest and posttest on all variables: intrinsic motivation, self-discipline, and motor skills normally distributed.

**Test manova for data pretest**

After normal distribution of data, inferential statistical analysis is performed to test the research hypothesis with Manova test. But before that, done prior homogeneity test of equality of covariance test to see the differences between groups. Here are the results of the test of equality of covariance between groups.

**Table 3: Test of Equality of Covariance Matrix**

<table>
<thead>
<tr>
<th></th>
<th>Box's M</th>
<th>F</th>
<th>DF1</th>
<th>DF2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiments</td>
<td>20880</td>
<td>3300</td>
<td>6</td>
<td>28679.057</td>
<td>.003</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on table 4.6, the results of the test of equality of covariance, obtained significance value (0.003) <0.05 that H1 is accepted. Thus we can conclude there is a difference between groups on covariance matrix so that the assumption of homogeneity covariance not fulfilled.

Further analysis of data in the form of Manova test to see the effect of the treatment on the dependent variable overall good intrinsic motivation (MI), self-discipline (SD), and motor skills (BMA). Here are the results of Manova test for treatment effect.

**Table 4 Results of Manova Test for Treatment Effects**

<table>
<thead>
<tr>
<th>Group</th>
<th>F</th>
<th>Pillai's Trace</th>
<th>Roy's Largest Root</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiments</td>
<td>1.282</td>
<td>0.716</td>
<td>0.716</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the results of Manova Test for treatment effect in Table 4.7 it can be seen that significance value 0.716 pretest either on the value of *Pillai's Trace* and *Roy's Largest Root*. Thus, Ho is accepted, so it can be concluded that there is no difference in the effect of treatment on the dependent variable either the experimental group or the control group. Because this data is the data pretest means good initial conditions in the experimental group and the control group are relatively equal and there is no treatment differences in initial conditions affect both study groups.

Then, Manova test analysis is done for the treatment effect on each dependent variable.

**Table 5 Results of Manova Test for Treatment Effects on the dependent variable**

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>STDEV</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic Motivation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Experiments</td>
<td>33</td>
<td>74.42</td>
<td>3.336</td>
<td>0.294</td>
<td>0.590</td>
</tr>
<tr>
<td>• Controls</td>
<td>32</td>
<td>73.91</td>
<td>4.321</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the test results manova in table 4.7, the values of all variables are significant for both intrinsic motivation (MI), self-discipline (SD) and motor skills (BMA) turns out all> the value of $\alpha$ (0.05), meaning that H0 is accepted. It can be concluded that there was no significant difference between the experimental group and the control group on the variables of intrinsic motivation, self-discipline and motor skills of students.

**Test manova for data posttest**

Posttest data is data obtained after completion of the treatment. This section will describe the results of the analysis of inter-group homogeneity test, the results of Manova test for overall treatment effect on the dependent variable and the entire manova test results for the treatment effect on each dependent variable.

**Table 6 Test of Equality of Covariance Matrix**

<table>
<thead>
<tr>
<th>Box's M</th>
<th>F</th>
<th>DF1</th>
<th>DF2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,836</td>
<td>1,712</td>
<td>6</td>
<td>28679.057</td>
<td>.114</td>
</tr>
</tbody>
</table>

Self Discipline

- Experiments
  - 33
  - 86.09
  - 7,907
  - 0056
  - 814

- Controls
  - 32
  - 85.44
  - 13,735

Barrow Motor Ability

- Experiments
  - 33
  - 3237.85
  - 1127.61
  - 0946
  - 0334

- Controls
  - 32
  - 3548.13
  - 1430.49
In Table 4.9 it can be seen that the results of the test of equality of covariance, obtained a significance value of $0.114 > \alpha$ value of 0.05 thus $H_0$ is accepted. It can be concluded that there was no significant difference between groups in covariance matrix so that the assumption of homogeneity is fulfilled.

**Table 7 Results of Manova Test for Treatment Effects**

<table>
<thead>
<tr>
<th>Group</th>
<th>F</th>
<th>Pillai's Trace</th>
<th>Roy's Largest Root</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiments</td>
<td>2.403</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on data in Table 4.10 it can be seen that manova test results for the treatment effect on the data obtained sig 0.02 posttest both in Pillai's Trace value and Roy's Largest Root. Thus, $H_0$ is rejected and $H_1$ is accepted so it can be concluded that there are significant task-oriented motivational climate to intrinsic motivation, self-discipline and motor skills of students in physical education, sport and health.

**Table 8 Results of Manova Test for Treatment Effects on the dependent variable**

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>STDEV</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrow Ability posttest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Experiments</td>
<td>33</td>
<td>3789.97</td>
<td>1357.41</td>
<td>0.004</td>
<td>0947</td>
</tr>
<tr>
<td>• Controls</td>
<td>32</td>
<td>3767.09</td>
<td>1400.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic Motivation Test Post</td>
<td></td>
<td></td>
<td></td>
<td>7:11</td>
<td>0010</td>
</tr>
<tr>
<td>• Experiments</td>
<td>33</td>
<td>77.12</td>
<td>5.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Controls</td>
<td>32</td>
<td>72.41</td>
<td>8.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self Discipline Post Test</td>
<td></td>
<td></td>
<td></td>
<td>15:03</td>
<td>0000</td>
</tr>
<tr>
<td>• Experiments</td>
<td>33</td>
<td>95.48</td>
<td>12:20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Controls</td>
<td>32</td>
<td>83.19</td>
<td>13:36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the data in the table can be seen that significant value to the variable intrinsic motivation and self-discipline $<\alpha$ value (0.05). Thus H1 is accepted, so it can be concluded that there are significant differences between the experimental group and the control group on the variable of intrinsic motivation and self-discipline.

Whilst, significant value to the variable motor skills at $0.947 > \alpha$ value (0.05). Thus Ho is accepted, so it can be concluded that there is no significant difference between the experimental group and the control group on the variable motor skills of students.

**Conclusion**

Based on the research results that have been obtained, it can be concluded that the motivational climate of learning is done in physical education, sport and health affect intrinsic motivation, self-discipline and motor skills of students. This study proves that a task-oriented motivational climate affect intrinsic motivation, self-discipline and motor skills of students. However, a significant effect only appears in the variable intrinsic motivation and students self-discipline, while the motor skills has no significant difference. This condition is certainly understandable given the fact that the change in learning outcomes in the form of skill or ability (physical or a motor abilities) requires constant repetition in a relatively longer time to achieve it. In contrast to the control group using ego-oriented motivational climate did not affect intrinsic motivation and self-discipline. So through learning with task-oriented motivational climate may increase intrinsic motivation and self-discipline of students.
REFERENCES


DEVELOPMENT OF A MODEL OF PHYSICAL EDUCATION FOR ELEMENTARY SCHOOL STUDENTS BUILD CHARACTER IN MEDAN

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Abstract

Physical education is implemented in a physical activity that is performed is an integral part of the overall education that has meaning in the developing human representative character in preparation for the Indonesian people fully. Primary School Curriculum clearly describe various physical activities motion to do the student, physical activity stored seeds of many characters that can be formed, such as discipline, honesty, concern for friends, cherish, obey the rules and be responsible. Many physical education teachers physical activity focuses on the acquisition of motor skills alone, to the exclusion of character values contained therein. This situation is caused by physical education teachers do not know the model of physical education that can form the character of students.

This study aims to determine the formation of character through the development of learning model of physical education at the elementary school students through the implementation of the 2013 curriculum subjects were fourth grade students and teachers of public primary schools physical education in Medan, North Sumatra.

Research using methods development (research and development) R & D refers to the opinion Borg & Gall (1983). Based on the research and development approach, the method steps include: research gathering information, planning models through modules that have been compiled, test models, a revised model as well as validation and dissemination models.
INTRODUCTION

Education is a planned effort in coaching and learning process for individuals to thrive and grow into a human being independent, responsible, creative, knowledgeable, healthy, and well behaved from the aspects of physical and spiritual. Human morality, which has a very high morality required to set up or constructed. This is in line with Law No. 20 of 2003 on National Education System who say that the purpose of education is "to be a man of faith and fear of God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become citizens of a democratic and accountable". Looking at current and future conditions, the availability of human resources character is a vital requirement. This was done to prepare for the challenges of the global and national competitiveness. It is not easy to generate human resources as stipulated in the law. The problem is until now human resources in Indonesia still don’t reflect the ideals of education are expected. Product childbirth education graduates who lack even the loss of a character (lost character) humanity.

The character now has become a major issue of education, in addition to being part of the process of moral formation of the nation, the character is also expected to become a major foundation in the success of Indonesia Gold 2025 education goal now is for a character that is manifested in the formation of the unity of the whole human behaviors and attitudes its life. This character can be obtained instantaneously, but through a long process starting from birth, if the application is a good character, which demonstrated by people who have good character then it will grow strong character in a person. Many ways and means to establishes the characters for children primarily through formal education. In addition to the environment and the family, the school is one of the families in terms of education to foster an honest, fair, open,
caring, and responsibility (Halit, 2011; Bohlin et al, 2001). In other countries, such as America, China, Japan, Korea and Turkey have implemented character education in the curriculum of primary schools (Eric, LU et al, 2004; Likona, 1994), in Indonesia instead of character education started college. How we can shape the character of someone who has grown up, is not that character formation begins from an early age.

The problem is how to grow the character early on in Indonesia, where Indonesia is not yet implemented in the elementary school curriculum in character. Foster character in children one of which is the social and emotional learning (SEL), which is inseparable from the development of physical, mental, and emotional (Santrock, 2002). Creating social and emotional learning (SEL) and character education (CE) can be stimulated through an activity or learning scenarios in physical education (Santrock, 2002).

Scenario learning in physical education is implemented in a physical activity that is performed is an integral part of education as a whole, so that physical education has a meaning that is quite representative in developing human character in preparation for the Indonesian people fully. The situation today when we look at the basic school level, where the curriculum clearly illustrates the full range of motion to do physical activity of students, in the physical activity of many stored seeds of characters that can be formed, such as discipline, honesty, concern for friends, cherish, obey the rules and responsible. However, many physical education teachers focused on the acquisition of skills activity physical movement (motor) only, to the exclusion of character values contained therein. This situation make physical education teachers also do not know the model of physical education that can form the character of students. It must be because until now there has been no learning model physical education for sure. Therefore, the need for physical education in the learning models
physical education, emphasizing efforts to form the character of students. Hopefully with the applied model of physical education the students will be able to form a strong character as expected.

Implementation research conducted applying the draft namely learning modules that are in the model and the material has been arranged. Learning models are implemented by physical education teachers in elementary school third research goal. This applied learning model tailored to the curriculum in 2013, which adapts to the material book teachers and students based on the syllabus books have been compiled nationally. RPP is designed to load the model of learning that will guide the teacher in the learning process. Of the implementation of learning undertaken by teachers are learning model appropriate to the material and the physical education needs of elementary school students to the formation of character.

DISCUSSION

A. Concept of Physical Education Nation Building Character

Indonesia's New Order era, since the first Indonesian President Sukarno, has designed a new concept of development of Indonesian society, which refers to the "character and nation building". This concept aims to build the character of the Indonesian nation into a high-quality human physically, mentally and socially, equitable, and prosperous. One of these development efforts, to make physical education and sport, both implemented in school and outside of school. Bung Karno, namely that the function of physical education and sport is very important because it can give a boost spirit (the spirit of nationalism) with full dedication of the life of Indonesian people want to make an advanced new, bold look to the future, cultivate character, discipline, sportsmanship and able to generate Indonesian nationality.
Contribution of physical education to the general purpose of education can be seen in various aspects, including the following: (a) physical education contribute to the total development of the student or as an individual. In the curriculum, physical education is a subject promoting the development of motor skills and physical fitness. Nothing in other subjects who development the psychomotor domain, except physical education, (b) values of physical education contribute to the health and well-being of the total students. Students who have a healthy body can learn efficiently and effectively, (c) physical education teacher contributes to students' learning readiness. Experience motion emphasis on learning readiness, (d) physical education contributes to the integrity of all the subjects contained in the curriculum. Integration of the student in question is expected to transfer from one lesson to the other subjects. For example, when studying the motion of students can learn about the power, the lever, and the laws of motion as found in physics. (e) the contribution of physical education to the development of cognitive skills or critical thinking. Examples of skills when students want to show motion, then the motion task is a process in which the student information required to analyze, evaluate, compare how motion events prior experience with motion events that will be displayed. (f) the contribution of physical education to the knowledge of the human body. For example: understanding of the various organ systems of the body such as the respiratory system, planning and so forth. (g) contribute to the development of physical education as affective values - social, emotional. Examples of social solidarity, commitment, esteem, and respect for others. Physical Education also contributes to the formation of self-esteem, self-concept and self-efficacy.

The formation of character in learning can be integrated into a curriculum. The curriculum is one element that contributes to realizing the potential quality of the
development process of students. The curriculum is now (2013) was developed based on competence as an instrument to guide the students to be capable and qualified human proactively answer the ever-changing challenges of the times and become educated man who is faithful and devoted to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens of character, democratic, responsible.

Curriculum 2013 is the development/refinement of the previous curriculum Competency Based Curriculum (CBC) which was initiated in 2004 and the Education Unit Level Curriculum (SBC) in 2006 which includes competency attitudes, knowledge and skills in an integrated manner to respond to the challenges of internal and external. The main target is the development of curriculum 2013 improvement mindset, strengthening governance curriculum, deepening and expansion of the material, reinforcement learning, and adjusting learning load in order to ensure compatibility between what is desirable with what is produced. Curriculum development is essential in line with the progress of science, technology and art and culture as well as society changes at local, national, regional, and global future. Various advances and changes will give birth to the internal and external challenges in the field of education, therefore the implementation of curriculum 2013 is a strategic step in the face of globalization and the future demands of Indonesian society.

Once the strategic curriculum 2013 is in readiness to face challenges in the future so that the curriculum is implemented on the basis of a few key principles, namely; First competency standards (SKL) derived from the needs. Second, the content standards derived from the competency standards through its core competencies (KI) free subjects. Third, all subjects should contribute to the formation of attitudes, skills, and
knowledge of learners. Fourth, subjects derived from competencies to be achieved. Fifth, all subjects are bound by core competencies. Sixth, alignment demands of graduate competencies, content, learning, and assessment. Applications that obey the principle of these principles is essential in creating a successful implementation of the curriculum in 2013.

Curriculum development was necessary given the wide range of opposition that will confront future-the future that both internal challenge, as well as external challenges. Internal challenges such as compliance with the eight (8) National Education Standards which include: management standards, standard costs, standard infrastructure, teachers and standards, content standards, process standards, assessment standards, and competency standards. Other internal challenges such as populations growth Indonesia seen from the productive age population growth. HR childbearing age haves the competence and skills will be a great development capital. External challenges facing the world of education is also considered more complex with regard to; 1) Challenge the future of globalization and advances in information technology; 2) Competence future is the ability to communicate, to think clearly and critically, responsibility, tolerance of different views and have a readiness to work; 3) The public perception is too emphasis on cognitive aspects, the student load is too heavy, less-charged character; 4) The development of knowledge and pedagogy that neurology, psychology, observation-based learning and collaborative learning; and 5) a negative phenomenon that raised student fights, drugs, corruption, plagiarism and cheating in exams.

Curriculum development 2013 begins by setting competency standards based on learner readiness, national education goals and needs. After the competency set is then determined curriculum consisting of basic curriculum framework and curriculum
structure. Education units and teachers are not given the authority to create a syllabus, but arranged at the national level. The teacher is given the opportunity to develop the learning process without having to be burdened with tasks arrange syllabus which takes time and requires a lot of technical mastery that is very burdensome teacher.

Teacher in developing learning process guided by the syllabus that has been compiled nationality.

**B. Models Learning on Curriculum 2013**

One of the fundamental changes in the curriculum in 2013 is a model of learning. Models-based learning curriculum in 2013 with a five-step scientific learning, while learning method in the previous curriculum using three step. In the previous curriculum, the Education Unit Level Curriculum (SBC), the three-step learning method, namely elaboration, exploration and confirmation. Whereas in 2013 the five steps of the curriculum, ie observing, questioning, reasoning, tried, and communicate.

The learning model is a form of learning that is reflected from start to finish is typically presented by the teacher. In other word, a learning model or frame is wrap application of an approach, methods, and techniques of learning. Based on Permendikbud No. 65 on Standards Process, preferred learning model in the implementation of Curriculum 2013 is a model of Inquiry Based Learning, Discovery learning, project-based learning, and problem-based learning. To determine the model of learning that will be implemented may consider the following matters:

- Compliance with competence learning model attitude at KI-1 and KI-2 and competencies of knowledge and skills in accordance with the KD-3 and / or KD-4.
• Compliance with the characteristics of the learning model KD-1 (if any) and KD-2 that can develop an attitude of competence, and suitability of learning materials with the demands of KD-3 and KD-4 to develop knowledge and skills competencies.

• The use of a scientific approach to developing learners' learning experience through observing, inquire (questioning), try/collect information (experimentingollecting information), associate/reasoning, and communicating.

C. Development of Learning Model

Dick and Carey Model (in Muin Sibuea, 2012) is one model that consists of systematic steps to identify the purpose of teaching, carrying out analysis of teaching, identifying personal characteristics of students, write specific instructional objectives, develop a measurement tool of learning outcomes, develop teaching strategies, developing and selecting instructional materials, designing and implement summative test, another model developed by Banathy (in Yusuf Hadimiarso, 1988) which is one of the many early models were adapted and developed. The first step in this model is the formulation of objectives, which contains a benchmark of "what" to do, "how well" done "and under what conditions". That goal should be specified such that it is clear that the task is done step by step. Then test to determine the size of student success. The third step is the analysis of learning tasks, these activities actually includes three sub-activities, namely: 1) analysis of the overall task of learning (knowledge, skills, and attitudes necessary to be studied), 2) competence assessment and initial assessment of the student, and 3 identification learning tasks are required. The third activity is the result of sub results of the first activity is reduced both activities. The results are categorized by banety to wear taxonomy Gagne (8 types of
learning: learning cues, stimuli, reaction, stringing, verbal association, discrimination, concepts, principles, and solve the problem). The fourth step, the design of the system, includes four sub tasks, namely: 1) Analysis of the function, 2) Analysis of components, 3) the distribution function between components, and 4) scheduling, analytic functions are the formulation of what should be done and how. Analysis component specifies who or what has the potential to perform these functions. Distribution functions concerned with what and who should be doing something special functions. While the detailed scheduling when and where the functions performed. In this study the development model of physical activity were made by adapting the Dick & Carey model, it is based on the consideration that in the Dick & Carey model prior to commission of goal setting, then the final step / stage activities to develop learning materials.

D. Research Approach

This study uses the research method development (research and development) R & D refers to the opinion Borg & Gall (1983). Based on the research and development approach, the method steps include: research gathering information, planning models through structured modules, test models, as well as the revision of the model validation and dissemination models.

a. Research Year I

The first phase, carried out the analysis or collection of information about the learning material covering physical education learning models made by the teacher to the student. At this stage of the analysis was also conducted on the learning model physical education needs, needs analysis is carried out to find suitable learning model physical education shaping the character of students. To obtain
research data collected from 3 elementary schools in the city of Medan, which is in SD Medan Deli State 064 011, SD Medan Barat State 060 840, SD Medan Helvetia State 064 981.

The research data was obtained from a variety of measurement techniques, such as field observations (implementation of the learning process), documentation (lesson plans, syllabi and teaching materials). The analysis is done by looking at the suitability of the material forming the character of physical education with elementary school students as well as a model of learning that is done by the physical education teacher.

b. Research Year II

Second phase, carried out the preparation of test instruments for students to know the state of the character of the fourth grade of elementary school students. After the preparations of the instruments then tested determines its validity and reliability. Once the instrument is valid and can be done for the pre and post test measurements characters.

Based on observations, input from teachers physical education instruments and test results, then draft the implementation of learning (RPP) with reference to the curriculum syllabus 2013 fourth grade teachers and students as well as the books are arranged in the form of a module as a teacher guide. The draft Implementation of Learning is structured to the needs of research for 2 semesters is applied to the fourth grade students by teachers at school physical education. The next step is a meeting with the teacher physical education primary research objectives for the perception of the lesson plans that have been developed for ease of implementation in school by the teacher, and then carried out the implementation of the pre-test (initial test) to
determine the character of the students before the beginning of the learning undertaken. Furthermore, the application of RPP in the learning process is done in the third semester in elementary school.

E. Location Research

Research conducted in the second year SD Medan Deli State 064 011, SD Medan Barat State 060 840, SD Medan Helvetia State 064 981.

F. Population and Sample

The study population was all students in elementary school located in the city of Medan. Purposive sampling technique using randomized sampling. In this study sampling aimed at fourth grade primary school students for fourth grade students are at a good age for the formation of character.

G. Data Collection Techniques

This research instrument used in this second year is a measurement scale character questionnaire to gather data about the characters that will appear on the student based on her answers.

H. Results Achieved.

The achievement of the results of the second phase of the research conducted in three elementary schools located in the city of Medan, namely SD Medan Deli State 064 011, SD Medan Barat State 060 840, SD Medan Helvetia State 064 981.

The activities performed during the execution of the study are: (1) to disseminate to 3 schools on a continuation of the first study, (2) develop a character
test instruments for elementary school students and to test the research instrument (3) designing a learning lesson plans in accordance with curriculum 2013 (4) Conduct a pre-test to the students to determine the character of the early students (5) carry out research in 3 schools by applying the draft modules in their lessons and adapted physical education teachers with teacher book and student books curriculum 2013 From some models turns out there are not implemented in accordance with the learning material, so that it becomes a record for the team to be able to adjust the model and the material in the book the teacher and student book 2013 achievement curriculum in the second year of this study are; Has composed a draft of the textbook as a module for teachers who guide material has contained therein a draft plan the learning program (RPP) which had been revised and adapted to the curriculum in 2013, Implement plan learning programs that have been started from second semester 2014.

CONCLUSION

Based on the results of research conducted while it can be concluded that the findings from the three schools in the second semester still found a few models that exist in the draft module which is not in accordance with the learning material and physical education teachers are still adjusting draft module with the teacher book and student books curriculum in 2013, physical education teacher has been able to grasp the concept of lesson plans in accordance with curriculum in 2013 only they still have difficulties in terms of assessment, because the learning process is carried out now physical education should be collaboration with several other subjects.

RECOMMENDATION

Based on the conclusions of the study, the researchers propose the suggestion that the modules that have been compiled can be implemented at a later stage.
REFERENCES


COACH-ATHLETES COMMUNICATION AND HOCKEY ATHLETES’ ACHIEVEMENT MOTIVATION

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ABSTRACT

The purpose of this study is to find out the correlation of coach-athletes communication and hockey athletes’ achievement motivation. The hypothesis proposed that there is influence in the correlation of coach-athletes communication to the achievement motivation in Indonesian hockey student athletes. This research based on how important of coach-athlete communication. Ideally, a coach’s relationship should be affective dan successful done by the coach to their athletes. This research used a quantitative research method. Sample was 130 Hockey Athletes, East Java Provence, Indonesia. This research analysis used a product moment methods. The result is about 0.3, means that the higher coach-athletes communication so the higher of the hockey athletes’ achievement motivation. The coach who has a good quality of interpersonal communication will improving athlete’s achievement. The athletes will be able to show their perception well and their effort to achieve their optimal performance.

Keywords: Coach-athlete, Communication, Achievement Motivation, Hockey, Athlete.
INTRODUCTION

Achievement motivation is an encouragement that of the individual associated with performance, the urge to control, manipulate and manage the social and physical environments, overcome obstacles and maintain high quality work, compete with efforts to create more action than past.

As an athlete, achievement is a matter of pride, both at the national and international arena. According Lavallee et al. (2004), the athlete is an individual who has unique characteristics. Athletes have their own talents, their own patterns of behavior and personality, as well as the background of life that affected him specifically. However, being an athlete is not easy. Besides having to train hard, salaries paid to athletes is part of the taxes paid by the public. So that the athlete has a great responsibility to society for the sake of good performance.

Hockey is a team sport that has a lot of members in the team. Hockey athletes compete here not only in improving achievement with hockey jock, but also to compete with other athletes in the hockey team. Hockey athletes’ desire to be able to improve his performance is affected by a high achievement motivation. High achievement motivation owned by hockey athletes are not only formed of himself for his wish, but the motivation to excel is also obtained from people who are nearby, especially by his coach.

Jowett and Poczwardowski (2007) analyzed coaches’ relationships with athletes in terms of their effectiveness/ineffectiveness and their being successful/unsuccessful. Coach-athlete relationship should be both effective and successful, the athlete maturing and improving his/her skills as well as achieving success. Peterson and Millier (2005) write of the alchemy of coaching, the coach is
responsible for transferring athletes or team member from one place to another
destination, that being performance success, or some other defined goal.

The quality of coach-athlete realtionship is important. A coach’s amiable,
approachable style might attract a similarly friendly and pleasant athlete, sugessting
reciprocity. Making hockey athletes feel comfortable atmosphere and there is no sense
of awkward during practice, and hockey athletes can increase the ability and potential
to the fullest. Basic reason for this research is that coach-athlete relationship in sports
is important. Coach-athlete relationship in a hockey team, sometimes ineffective,
because every coach and athlete has different characteristics. There is a coach who
can understand his athletes, but there are also coaches who do not understand do not
even care about the athletes. Whether the coach-athlete relationship effect on
achievement motivation in hockey student athlete?

METHOD

Participants

The sample of this study is 130 subjects who participate hockey student athletes
of East Java Province Sports Competition 4th.

Instrument

Coach-athlete relationship scales (20 items) with coeficient reliability 0,95 and
achievement motivation scales (20 items) with coeficient reliability 0,89.

Data Analysis

The data analysis technique used in this study was a product moment technique.
RESULTS

The result of the analysis of product moment is 0.3 with sig value of 0.01. There is a positive relationship between coach-athlete relationship and achievement motivation. This means that the higher coach-athlete relationship, so the higher the achievement motivation of the athlete.

DISCUSSION

Achievement motivation is the most important thing that should be owned by everyone, especially by an athlete. Sometimes athletes’ achievement motivation can be increased or decreased. Changes in athletes’ achievement motivation experienced can influence when competition. In order for the athlete, achievement motivation can be increased or have high achievement motivation, so here the role of the coach as a person who is close and knows the state of the athletes restore and provide motivation to excel to the athletes.

The qualities of closeness (trust, liking) or connectedness (affinity) coach-athlete is important (Mageau & Vallerand, 2003). The coach-athlete relationship and their methods are often appraises in term of their strengths or weakness, excellence or incompetence, insight or ignorance, research suggests that there are few stable qualities possessed by coach that are effective and successful across all situations. So for communicative coach, it will be easier to prepare for what is communicated to the athletes, it would be to motivate the athletes to improve the athlete's performance.

Based on the result of this study, researcher gave some suggestions that could be considered for the hockey coach. Coach-athlete communication empirically shown a relationship to hockey athletes’ achievement motivation. So if an athlete experiencing a decrease achievement motivation, things that could be done by the coach with
approach followed by good communication. Coach with good interpersonal communication improving quality of closeness (trust and liking) and aims to raise athletes’ achievement motivation.

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ANTHROPOMETRIC AND PHYSICAL FITNESS CHARACTERISTICS OF MALE JUNIOR TAEKWONDO ATHLETES

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State University of Surabaya

ABSTRACT

Taekwondo is one of the martial art rooted from Korea. Taekwondo is also as one of the combat sport that has been competed in Olympic games. The purpose of this study was to analyze anthropometric and physical fitness characteristics of the male junior taekwondo athletes at the Centre of Training and Education for Students (PPLP) in Medan Indonesia. This research was conducted on 9 male junior athletes PPLP Medan North Sumatera. Data was collected by measuring some physical and testing some physical fitness components of the athletes. Those data were taken from height and body mass for anthropometrical measurements; vertical jump for explosive power testing, shuttle run for agility testing, VO2 max for capacity aerobic testing; stork stand test for balance testing, sit and reach for flexibility testing, push up for hand muscles strength testing of physical fitness. Data was analyzed by using mean and standard deviation. Results of this research showed that the average of anthropometrical measurement on height and body mass were 165.44±0.05 cm and 51.22±9.13 kg. Mean of vertical jump and shuttle run of the athletes were 48±5.22 cm and 3.97±0.24 seconds. Mean of VO2 max of the athletes in this study was 45.94±5.43 ml/kg/min. Mean of stork stand test, sit and reach, and push up of the athletes were 30.67±22.96 seconds for right leg, 35.90±16.06 seconds for left leg, 21.17±5.87 cm, and 24.0±4.85, respectively. The conclusion of this research showed that the athletes tended to have slightly less proportional for their anthropometrical, high anaerobic power, less aerobic capacity, less in balance but they were good in flexibility and hand muscles strength for their physical fitness.

Keywords: anthropometrical, physical fitness, male junior athletes, taekwondo
INTRODUCTION

Nowadays, Taekwondo has been competed in a modern Olympic Games. Actually, Taekwondo rooted in an old Korean martial art. Taekwondo has significant developed as a combat sport that it was started with the foundation of the World Taekwondo Federation (WTF) in 1973. Recently, this Korean martial art exists in two forms under the control of two organizing bodies, the World Taekwondo Federation, which accentuates sports competition and performance, and the International Taekwondo Federation (ITF), which advocates for a more traditional form of Taekwondo (Markovic G, et al, 2005).

Taekwondo athletes need to have a good not only on anthropometric but also physical fitness in order to support their performances during the competition. Bridge et al (2014) reported that the physical and physiological demands of modern day competition require athletes to be competent in several aspects of fitness. This review critically explores the physical and physiological characteristics of Taekwondo athletes and presents implications for training and research.

There are some research that have been conducted relating to anthropometric and physical fitness of Taekwondo athletes in many countries in the world. Cassolino et al (2012) have done research about physiological versus psychological evaluation in Taekwondo elite atletes. This research was conducted on 5 national Italian athletes and 20 elites Italian black belt athletes. They repoted that session RPE and [La] seem to be more effective than psychological measures in discriminating between elite Taekwondo athletes. Evaluation of mood could be effective in monitoring athletes’ response to national training.
In addition, Zen-Pin and Ryder (2008) conducted research about the study of physiological factors and performance in welterweight Taekwondo athletes. This study was conducted on 10 Taekwondo athletes from a Division 1 University. They stated that to recover the rest state more time and improve intensive training in the blood lactic acid system and power output.

Furthermore, Markovic et al. (2005) conducted research about fitness profile of elite Croatian female Taekwondo athletes. This study was conducted on 13 national Taekwondo champions. They stated that the performance of Taekwondo female athletes primarily depends on the anaerobic alactic power, explosive power, expressed in the stretch-shortening cycle movements, agility and aerobic power.

Anthropometry is the study of measurement of the human body in terms of the dimensions of bones, muscles, and adipose tissue. The first two measurements taken in the anthropometric profile, that is height and body mass (Norton and Olds, 2000). Height is one of key determinant for success in some of sports including Taekwondo. In Taekwondo, small increases in body mass significantly impact on performance and categories of fighting.

Physical fitness is important for the Taekwondo athletes in order to have better performance. There are some components of physical fitness including strength, endurance, flexibility, speed, explosive power, agility, and balance. Strength is defined as the maximum muscular force which can be exerted in a single effort; flexibility is defined as the range of motion at a join or series of joints (Roberts, 1991). Strength is required in Taekwondo especially in legs and hands muscles. The performance of Taekwondo athletes relies heavily on the adenosine triphosphate phosphocreatine pathways and glycolytic pathways, such as repetitions efforts of fast
attacks and/or counterattacks. Vertical jump one of the physical fitness test that is an established measured of explosive or anaerobic power of the lower limbs and hips. VO$_2$max is generally agreed to be the best indicator of maximum aerobic power.

Although some research have been investigated in anthropometric and physical fitness of Taekwondo athletes in some countries, however, in Indonesia those details are rare. Therefore, the purpose of this research was to analyze anthropometric and physical fitness characteristics of the male junior taekwondo athletes at the Centre of Training and Education for Students (PPLP) in Medan Indonesia.

**METHODS**

The research was conducted on 9 males junior athletes PPLP in Medan North Sumatera Indonesia. Data of anthropometrical measurement and physical fitness have been collected at the indoor arena. Anthropometrical measurement were taken from height (cm) and body mass (kg) of the athletes using stadiometer. During the measurement, all athletes wore t-shirt and shorts with no shoes. Physical fitness characteristics were tested by using vertical jump for explosive power testing, shuttle run for agility testing, VO2 max for capacity aerobic testing; stork stand test for balance testing, sit and reach for flexibility testing, and push up for testing of hand muscles strength. Vertical jump was tested by using Sergant Jump. VO2 max was tested by using 20m shuttle run test/multistage fitness test. Data was analyzed and reported as Mean±Standard Deviation (X±SD).

**RESULTS AND DISCUSSION**

The results of the study showed that the mean value for height and body mass of the athletes in the present study were 165.44±0.05 cm and 51.22±9.13 kg,
respectively. The mean of vertical jump and shuttle run of the athletes were 48±5,22 cm and 3,97±0,24 seconds. The Mean of VO2 max of the athletes in this study was 45,94±5,43 ml/kg/min. The mean of stork stand test, sit and reach, and push up of the athletes were 30,67±22,96 seconds for the right leg, 35,90±16,06 seconds for the left leg, 21,17±5,87 cm, and 24,0±4,85, respectively. Mean values for anthropometric and physical fitness of the study were presented in Table 1.

Table 1. Mean values for anthropometric and physical fitness of the study

<table>
<thead>
<tr>
<th>Components</th>
<th>Mean±SD</th>
</tr>
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<tbody>
<tr>
<td><strong>Anthropometric:</strong></td>
<td></td>
</tr>
<tr>
<td>- Height (cm)</td>
<td>165,44±0,05 cm</td>
</tr>
<tr>
<td>- Body Mass (kg)</td>
<td>51,22±9,13 kg</td>
</tr>
<tr>
<td><strong>Physical Fitness:</strong></td>
<td></td>
</tr>
<tr>
<td>- Vertical Jump (cm)</td>
<td>48±5,22 cm</td>
</tr>
<tr>
<td>- Shuttle Run (seconds)</td>
<td>3,97±0,24 seconds</td>
</tr>
<tr>
<td>- VO2 max (ml/kg/min)</td>
<td>45,94±5,43 ml/kg/min</td>
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<tr>
<td>- Stork Stand Test (seconds):</td>
<td></td>
</tr>
<tr>
<td>• Right Leg</td>
<td>35,90±16,06 seconds</td>
</tr>
<tr>
<td>• Left Leg</td>
<td>21,17±5,87 cm</td>
</tr>
<tr>
<td>- Sit and Reach (cm)</td>
<td>35,90±16,06</td>
</tr>
<tr>
<td>- Push Up (times)</td>
<td>24,0±4,85 times</td>
</tr>
</tbody>
</table>

From the Table 1 above, it can be seen that body size of the male junior Taekwondo athletes in the present study were slightly less proportional. These athletes need to increase their body mass for about 3-5 kg. This athletes were shorter and lighter compare to the Division 1 University (height 174,6±2,8cm; body mass
63.6±1.4 kg) reported by Zen-Pin and Ryder (2008). It might because the athletes in the present study were approximately 4 years younger than reported on the literature review.

The male junior Taekwondo athletes in the study was found to have good anaerobic power. Bridge et al (2014) reported that Taekwondo athletes demonstrate high peak anaerobic power characteristics of the lower limbs and this attribute appears to be conducive to achieving success in international competition. The ability to generate and sustain power output using both concentric and ‘stretch-shortening cycle’ muscle actions of the lower limbs may be important to support the technical and tactical actions in combat.

The mean value of VO2 max of the athletes in the present study need to be improved to moderate to high level of cardiorespiratory fitness. VO2 max is important to support the metabolic demands of fighting and to facilitate recovery between consecutive matches (Bridge et al, 2014). The hand muscles strength of the athletes in this study can be categorized good. Taekwondo athletes need to have high dynamic strength in order to support their performance especially kicking and punching. The flexibility of the athletes in the present study have a good flexibility. The dynamic nature of the technical and tactical actions in the sport demand high flexibility of the lower limbs (Bridge et al, 2014). Balance is important for Taekwondo athletes in order to support their ability to stand with one leg while they kicking their opponent. Therefore, Taekwondo athletes should have a better balance in order to have advantages during their performance. To be a champion in Taekwondo, athletes need to have not only good in technical, tactical, and psychological, but also anthropometric and physical fitness. It should be considered by Taekwondo coaches in order to give them into training program.
CONCLUSION

The conclusion of this research showed that the male junior Taekwondo athletes in this study tended to have slightly less proportional for their anthropometrical, high anaerobic power, less aerobic capacity, less in balance but they were good in flexibility and hand muscles strength for their physical fitness. Although there are some research have been done related in anthropometrical and physical fitness of Taekwondo athletes in some countries, there has been limited research that have been conducted and reported in Indonesia. Therefore, more extensive research is strongly recommended in anthropometrical and physical fitness of characteristics of Taekwondo athletes in Indonesia in order to extend existing knowledge as well as to describe the characteristics of strength and conditioning of Taekwondo athletes at different populations.
REFERENCES


ABSTRACT

An elite athlete is a rare combination of talent, hard work and the right psychological profile. Therefore, the purpose of this study was to describe psychological capital as the key determinants of those who emerged as talented athletes. In this study 88 student athletes in SMA Negeri Olah Raga (Senior High School of Sport) Sidoarjo, East Java completed psychological capital measurement. Psychological capital questionares consist of four positive psychological resources of hope, optimism, efficacy, and resilience. Results revealed that student athlete were characterized by higher scores on efficacy and hope. The moderate scores in resiliency and optimism.

Key words
Psychological Capital, Profile, Student athletes

INTRODUCTION

Based on international research, sport psychology has long been making its impact in the field of sports. One of the facets of the field is the determination of future performance through the possibility that elite athletes possess psychological characteristics that make athletes successful in their particular sport. Sport psychologists have been interested in identifying what psychologically made athletes great. Recent research like Hanton and Jones (1999), Durand-Bush and Salmela
(2001), and Gould, Dieffenbach and Moffett (2002) have begun to examine how athletes developed these psychological characteristics such as psychological capital.

Conceptually Psychological capital has been identified by Luthans and colleagues (Luthans, 2002; Luthans & Youssef, 2004; Luthans, Youssef, & Avolio, 2007) as consisting of the four positive psychological resources of hope, optimism, efficacy, and resilience, which, when combined, have been empirically determined to be a second-order core construct (Luthans, Avolio, Avey, & Norman, 2007). A second-order construct is the shared variance between the four first-order constructs (hope, optimism, efficacy, and resilience). The comprehensive definition is that PsyCap is an individual’s positive psychological state of development characterized by: (1) having confidence (efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resilience) to attain success (Luthans, Youssef, & Avolio, 2007)

As indicated above, only a few studies carried out in concerned student athlete participants. Only a limited number of articles report empirical data on psychological profiles of student athletes. Most of them stress the importance of psychological skills (or performance strategies) used by high performers (Vealey, 2007). Early research in this presented a profile of the psychological characteristics of short-distance beginning swimmers in Egypt (Khalil, 2011). Through this review of previous study, there is no profile of the psychological characteristic of Indonesian student athlete especially in SMA Negeri Olah Raga (Senior High School of Sport).

Based on the literature reviewed above, this study has two purposes to provide descriptive data on psychological capital of student athlete in Indonesia, especially in SMA Negeri Olah Raga (Senior High School of Sport).
METHODS

Subject
The Subject of research are 88 students athletes (Female= 28, Male = 88, age = 14-17 year old) in SMA Negeri Olah Raga (Senior High School of Sport) Sidoarjo, East Java.

Instrument
Adapted Psychological Capital Questionnaire by Luthans, et al. (2007), there are consist of four facet efficay, hope, optimism, and resiliensi.

RESULT AND DISCUSSION

Result revealed that student athlete were characterized by higher scores on efficacy. Self efficacy makes elite swimmers able to do what is necessary to get his/her expectations. Self efficacy can make someone behave appropriately to reach a desired result. Student athlete with high efficacy know that much of their efficacy is developed through experiencing success. They have learned to work on the controllable factors in practice that can be developed to help them enhance their abilities (and give them a feeling of success). They know that to be efficacy when they step up to race, they have to have put in the work

This finding is supported and consistent with the existing literature (Khalil, 2011). One of the most consistent findings in the peak performance literature is the significant correlation between efficacy and successful sporting performance

This results regarding the higher score in hope. With regard to hope characteristics, the finding that indicate a quality driven goal, wanting to achieve a high level of performance, committment and conscientiousness. Student athlete are driven to achieve the best in their sport and are persevering to get to the top. These findings are consistent with the achievement goal literature which posits that high level athletes present high scores on the performance-approach goal (Mallett &
Hanrahan, 2004; Pensgaard & Roberts, 2000). Hence, trying to demonstrate his/her competence to others seems to constitute a powerful source of motivation for athletes.

This results regarding the moderate scores in optimism and resilience. Optimists will expect the context will improve for them. Student athlete can combat the stressors which in turn are less likely to generate the frustration. Optimists make student athlete stable, and global causal attributions of positive events.

This results regarding the moderate scores in resilience. Resilience is the capacity to rebound or bounce back from adversity, conflict, failure, or even positive events, progress, and increased responsibility. Student athlete try to persistence in training process with resilience.

All This finding are supported and consistent with the existing literature on meta-analysis study, psychological capital significant positive relationships between PsyCap and performance (Avey, et al., 2011). One of the most consistent findings in the peak performance literature is the significant correlation between psychological capital and good performance.

Due to the design of the study, some limitations have to be mentioned. The goal of the study was to focus on a population that is difficult to explore: student athlete. Secondly, we used a crosssectional design that did not enable us to shed light on the consequences of goal performance. A field study using a longitudinal design should be used in the future.

According to the results of this research, there are several suggestions:
1. Using the psychological capital to evaluate the mental skills of the student athlete in senoir high school of sport.
2. Making the assesment measurement of psychological psychological of Indonesian student athlete.
3. Making standard levels of the psychological capital of Indonesian student athlete
4. Sport psychologists and coaches to design more effective training plans, incorporating psychological capital that need to be enhanced
REFERENCES


Risk Management Method for Managing Violence Spectator in Soccer events

R.Syaifullah D.Sihombing

Introduction

In the staging sport events especially in the soccer events there are kind of incidents could happen whether small incidents or huge incidents. The most paramount incidents where soccer competitions held is due to bad spectators’ attitudes. These situations become worse because of uncontrollable emotional fanatic spectators. Fighting, riot, hooliganism, and terror in the soccer competitions happened whether in a local, national or even international competitions, and whether amateur or professional leagues. Furthermore, this violence caused by undesirable tragedy which requires victims whether human being lives or ruined properties.

Those situations above indicate that the challenges in the sport events from any tragedy are still happening. Furthermore, the types of the challenges are not similar at one sport venue to another sport venue. Soccer is the one of sport event which has an exclusive paradigm. On one hand, the involving of high numbers of spectators in soccer events becomes a key success of sports manager on staging this event. On the other hand, failed in anticipating undesirable incidents will cause not merely management fault but more at undesirable victims. Furthermore, involving several death and injuries at large public events have happened consistently over a broad spectrum of countries and types of event (Ammon et al, 1998). Hence, the way to managed-well soccer events seem to be the key factor for organizer. In this case, risk management holds an important role in anticipating undesirable incidents in the
event. With regard to the issue, this essay examines the important of risk management in managing spectators particularly related to soccer events. In addressing to this issue this essay focuses on brief explanation in the spectator violence within soccer events, and crowd risk management.

**Spectator violence**

There has been growing concerns on violence caused by spectator in soccer events. According to Elias and Dunning cited in Frosdick (2004, p.1) argued that Spectator violence at sport event have had happened since a long time. Moreover, he stated that it is an ancient and historical problem, based on disorder from the supporter of chariot-racing team in ancient Rome, called the “Blues” and the “Greens”;. Many modern ball games are gained from middle-age characteristics played in England since 13\textsuperscript{th} century. This was an explanation offered as reason for being excused for fighting which regularly featured violence, death injury and damage. It is revealed that in the late 1960s research on football violence has continually grown in Britain, and, later on, in many European countries (Tsoukala, 2007, p.1). Roberts and Benjamin (2000, p.164) explained that the numerous visible and serious manifestations of violence in sport are associated with football, a professional sport that take a highly involving punishment to violence to occurring on the field. Moreover, Ingham (2000, p.151) stated that many scholars argue that soccer to be more violent than it used to be. He argued that there is a trend to view violence as basically physical that is, the intentional act of inflicting of pain and/or injury to another person, or damage to property. Furthermore, those incidents seem to be caused by involving fanatic’s spectators within soccer matches that bring into startling
consequences, whether human being or properties. For example, spectator trouble that had happened in match between Peru and Argentina, bring it into intervention of policeman included the use of tear gas and bullets, and lead to panic over 300 spectators were killed and 500 injured. In addition, 5 people were killed due to home supporters attacked the visiting team (Ingham, 2000, p.148). Surprisingly, this kind of incident did not just happen in the international level. In the local level such as North America, Ammon et al. (1998, p.119) reported that an incident happened lead to seventy-seven spectators injured in the attempted “rush” onto the field when Michigan and Wisconsin football matched in 1993. The other violence pattern in soccer events is “hooliganism” which has distinctive characteristics. According to Zani et al. (1991, p.6) it is revealed that in languages other than English the word ‘hooligan’ has also become popular, and usually refer to violent fanatic football spectators, independent of the country from which they come. Moreover, according to Giulianoti cited in Spaij (p.1), hooliganism known as the behavior of socially organized behavior or established system fan (hooligan) groups which involve in competitive violence, especially with hooligan groups. Lawrence (1986, p.1) explained that the worst tragedy caused by hooliganism was happened on 29 May in 1985 at Brussels Stadium, as a result of spectator violence prior to the commencement of the European Cup between the British soccer team and the Italian Team Juventus was 38 people were killed and 437 injured. Moreover, it is revealed that due to provocation from supporters of both sides Liverpool charges a fence separating the British and Italians, as a result this incident had occurred. The concrete wall was collapsed under pressure due to British fans attempt to retreat the Italian crowd by pushing the concrete wall. Almost victims killed due to crushed beneath the collapsing wall and under the feet of escaping spectators. Those dramatic incidents
above have had tragic consequences and these needs to be coping seriously. The paramount importance and must be a basic principle is a spectator safety which becomes facility’s philosophy to ensure continued spectator attendance. Ammon et al. (1998, p. 120). As a consequence, to those who involved within sport events must be aware of and trying hard to anticipate the risk will be occurred.

**Risk Management of crowd events**

Experiences have proven that certain event, such as soccer, due to their nature; require particular planning for avoiding any kinds of undesirable incidents from violence spectator. Since when an accident happens where there is a congestion of people many lives can be lost the management and control of crowds is a crucial problem for human life and safety, (Dickie cited in Marana et al, p.165). In addition, since spectator could prove costly to gate money sports enterprise the club committees and course executive were interested to take step to control crowd behavior (Vamplew, 1980, p.5). Hence, there are many kinds of effort to overcome spectator disorder. It is revealed that at the end of nineteenth century there were five major methods to overcome spectator disorder such as, improvement in the conduct of sport; improvement in the conduct of sport; improvement in the organization of the sport event; segregation within the crowd; control of ancillary activities; and the use of control agents(Vamplew, 1980, p.11). Meanwhile, in terms of management and design items Paul cited in Sime (1995, p.3) stated it is important to address in assessing crowd safety during ingress, such as the number and location of entrances, design door for ingress, risk of excessive crowd concentration, separation of ticketing and admission, orientation and admission, orientation/directional graphics etc. Those all concepts earlier shown on how the way to be success in staging soccer events by applying risk management. As a result, when all the characteristics of crowd
management and control are well organized many problems involving crowds can be prevented or quickly resolved (Marana et al, 1998, p.165).

In respect to this matter, Farmer et al, (1996, p.76) argued that it is extremely important to sport facility manager to understand risk management concept. Moreover, Farmer et al, (1996, p.76) and Westerbeek et al, (2005, p.160) defined that risk is a great danger or the possibility of revelation or harm. Furthermore, they stated that minimizing financial loss and liability exposure resulting from injuries to patrons is the most common problem faced by sport facility managers. In this circumstance, the responsibilities of the facility or event senior management team are defining and documenting their strategy for risk management. By quoting Hughes, Westerbeek et al, (2005, p.160) stated that this policy should incorporate the following principles relating to risk:

1. Organization’s rationale for managing risk
2. Objectives for and commitment to managing risk
3. Links between the policy and organization strategic plan, including the range of issues applicable
4. Guidance on what may be regarded as acceptable risk
5. Who is responsible for managing risk
6. Support available for those responsible for managing risk
7. Level of documentation required, and
8. Plan for reviewing organizational performance with respect risk

Moreover, he explained that some of the common risks areas in sport facility and event management are identified below:
a. sport participation
b. spectators
c. legal issues (legal ability, contracts, insurance)
d. athlete protection
e. loss prevention
f. storage
g. accreditation
h. facilities/equipment(properties
i. hiring
j. training
k. transport
l. safety/security
m. environmental factors (natural events)

n. economic circumstances
o. political circumstances
p. management activities and control
q. human behavior
r. terrorism

In addition, Berlognhi (1995, p.245) stated that many factors which will become trigger for incidents in staging events are:

1. Operational circumstances: lack of parking, no-show performers, cancellations, and sold out event
2. Event activities: special effect (smoke, lasers, fireworks), music, load noises, video replays.
3. Performer’s action: sexual and violent gestures or comments, dare-devils or macho challenges, performer invitations.

4. Spectator factors: consuming alcohol, rushing for seating, overnight waiting, crowd cheering, crowd activities (the have, playing with inflated balls), throwing objects.

5. Security or police factors: use of excessive or unreasonable force, altercations or argument with spectators, provocations, abuse of authority.


Furthermore, Westerbeek et al, (2005, p.160) argued that the sport facility or event manager must take for granted accountability for and be prepared for risk. Furthermore, he argued that the process of risk management, in order to be effective, involves understanding five key components, such as: recognizing risk, analyzing risk, assessing risk, treating risk, monitoring risk (creating standard operating procedures to manage risk).

Eventually, they stated the phase of risk Identification is the where the facility must discover the different risks that could possibility loss the property. Moreover, they explained that when identifying risk primary and secondary factors need to take into account, and manifest this aspect which is directly applicable to daily operations of the facility (primary factors). For example of this is where intoxicated spectators are removed forcibly by the security staff. It is very important to identify alcohol and drug (Westerbeek et al, 2005, p.162). The consumption of alcohol and drugs can significantly influence on the tendency of people to violence because it leads to unnatural behavior to the use of violence that individuals attain through the
socialization and it also increases the risk taking of individuals (Frini et al, 2008 p.13). The second phase is risk analysis, risk analysis is related to analyze into which are potential factors that have greatest effect. The third phase is risk assessment, this phase dealing with the importance of comparing the level of risk during the analysis process with risk criteria that being established previously. Subsequently, then bring to a decision whether risks can be generally approved. If the risk included into the low or generally approved categories, they are including in general approved with minimal further treatment. However, monitoring and classifying of risks must be considered that the risk is still generally approved. Once the risk is not acceptable then it should be using one or more of the possible treatment options. The fourth phase is risk treatment. This phase is trying to see the risk whether to avoid completely or to keep it and trying to reduce its impact. The last phase is risk monitoring; risk monitoring dealing with the proceeding assessment and continual evaluation of potential risk and attention to new emergent risks that may influence operations. Moreover, the sport facility and event manager must be taking into account in ongoing changes and revise each risk suitably (Westerbeek et al, 2005, p.162).
Conclusion

Incidents in staging sport events, such as soccer is not new. The most paramount incidents where soccer competitions held is due to bad spectators’ attitudes. Spectator violence leads to financial loss and liability exposure resulting injuries, death, ruin properties. Hence, due to those consequences, risk must be managed seriously, or it can have significant bad effect. In this circumstance, sport facility manager and event manager should be able to applied risk management method. Risk management approached method, such as identifying, analyzing, assessing, assessing, treating, monitoring, and communicating risk are required for staging events to avoid undesirable incidents in uncertain situations. Importantly, preparedness is a key factor for the success of staging sport events.
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Abstract

One factor that must also be considered in the sports organization is the management. If the management is good, it will help accelerate effective and efficient achievement. The development of athletics in the province of East Java can be quite good. This is due to the establishment of an athletics clubs in the East Java East Java province. Where the organization is a hub that foster athletics and athletes who excel at the regional, national and international. So it can help advance the achievement in PASI Pengcab East Java province.

The purpose of this study was to obtain information about 1) Coach and Athlete Recruitment System, 2) Stewardship System, 3) Facility for Infrastructure, 4) Exercise Program, 5) Achievement, and 6) Funding and Administration in East Java Province athletics club. The target of this research was athletic clubs in East Java province. The analysis method was using descriptive qualitative method, while the process of data retrieval is done using interviews.

Results of the study are: 1) the search of gifted athlete performed by holding the race 5k and 10k level elementary school, junior high, and high school coaches to recruit athletes based on experience. 2) The development and condition of the athletic club in East Java province has been going well. 3) facility infrastructure is still inadequate as evidenced by the lack of facilities for field jump. 4) The exercise program given by athletic club coaches in East Java province tailored to the athlete's ability. 5) a tryout was held every month with the aim to measure athlete's ability. 6) Funds from KONI was given every 6 months. Some infrastructure improvements inadditions, should receive special attention. Conclusions: 1) Athlete recruitment has been running smoothly, and there is a need to conduct various competitions from elementary, junior and high school. Coach recruitment has also been running well since the recruitment process was followed by coaching training. 2) Duties and leadership in the athletic clubs of East Java province was held by Mr. Amir Hamzah Amang Mulahela. 3) Facilities and infrastructure in East Java Province athletics club was adequate compared with the clubs outside the East Java, 4) Quality athletic club coaches in East Java province was quite good, with
the application of quite a good exercise program, leading to an increase in the athlete's performance. 5) Evaluation of athletes' performance was good with every month tryout. 6) The administrative system of athletic clubs in East Java province can be said to be good enough. Operating funds coming from KONI is given in every 6 months.

Keywords: Evaluation, Management, athletic clubs in East Java, East Java Province
INTRODUCTION
Good coaching is very influential, especially for athletes who are still in the beginning of the training. Usually children beginners did not enjoy sports to the full. Therefore the coach must know how to treat and improve the athlete's ability.

Coaches should be supported by a good management with the aim to help accelerate achievement. Management is a process of planning, organizing, and monitoring or evaluating the process that the implementation of plan and guidance can work well as expected.

From the above introduction, the researchers wanted to know how to apply athletic coaching and training in athletic clubs in East Java province.

Focuses of research

1. How was the recruitment of athletes and coaches in the athletic clubs of East Java Province done?
2. How was the management system in East Java Province athletics club?
3. How was the infrastructure facilities in East Java Province athletics club?
4. How was the training program in East Java Province athletics club?
5. What achievement does athletics club in East Java Province get from 2011 to 2012?
6. How was the funding in the province of East Java athletic club?

Research Objectives

1. To understand the process of recruitment of athletes and coaches in the athletic clubs of East Java Province.
2. To understand the management system in East Java Province athletics club.
3. To know and understand the infrastructure facilities in the athletic club in East Java province.
4. To evaluate the athletic training program.
5. To analyze the achievement in athletics club of East Java province from 2011 to 2012.
6. To understand the funding in the athletic club East Java province.
Importance Issues to be Investigated.

Management is an influential factor in creating an outstanding athlete and for the regeneration of junior athletes in order to keep and maintain a good achievement responsibilities in developing the sport in athletics through athletic club in East Java province.

Benefits of Research

1. The results can be utilized by coaches in the athletic club in East Java province as a reference for improvement.
2. The result of the research was used to improve the goal, to optimize achievement.
3. This research was very useful for experience for the betterment of future management to support better coaches.

Operational Definitions and Limitations of the Study

1. Operational Definitions
   a. Evaluation is the process of assessing and evaluating the goals and decision making to achieve the goal.
   b. Coaching is a kind of business action to change situation to get better to achieve the goals.

2. Limitation of the study
   a. Research conducted only at the athletic club coaching in East Java province.
   b. The study only focused on management issues in the athletic clubs in East Java province.

Athletics is classified as a branch of the sports in the world, the oldest so that sometimes it called the mother of sport. Its was done starting with simple movement to a more complicated movement. According to Joy (1992:10) the number of events in athletic competition can be divided as 4 groups, namely:
1. The street number, which consists of a distance of 5 km, 10 km, 20 km, and 50 km.

2. Number run, which consists of:

   a. Sprint: 100, 200, and 400 meters.
   b. Middle distance running: 800, 1500 meters.
   c. Long-distance running: 3000, 5000, 10,000 meters, and marathon, 42.195 km.
   d. Special Run: 100m hurdles, 110m, 400 m and 3000 m steeplechase run.
   e. Relay: 4x100m, 4x200 m and 4x400 run.


3. Throwing: javelin, discus throwing, palmhammer, and shot put.

According to George R. Terry (in Noegroho, 1998:1) the management is achieving the goals set in advance using the activities of others. Management is one of a group of social science. The term management is a term used in the US and the UK, while each country in Europe has its own terms which is not the same as the form and content. The functions of management are Planning, Organizing, Actuating, and Controlling. Thus, a person becomes a manager of a company acts as "commander of an army". The elements of management are:

1. Planning.
2. Organizing.
3. Movement (or Actuating).
4. Monitoring (or Controlling).

Siagian and Sondra (1898) classified management functions as:

a. Planning
b. Organizing
c. Motivating
d. Supervision (Controlling)
e. Assessment (Evaluating)
According to Slameto (1988: 4), evaluation is the process of understanding or giving meaning, obtaining and communicating the information to the user-the decision maker. According to Sukardi (2008:1), evaluation is a process that determines the conditions, in which a goal has been achieved. This definition explains the direct relationship with the goal of an activity evaluation that measures the degree in which a goal can be achieved.

The evaluation process should be appropriate to the type of goals that are usually expressed in terms of behavior. Because not all behavior can be expressed by means of the same evaluation, the evaluation becomes one of the things that is difficult and challenging. The main function in this evaluation is to provide information useful for the decision maker to determine the policies that will be taken.

Evaluation is essentially an activity to measure behavioral changes that have occurred. But not everyone is aware that every moment we always do the job evaluation. Conducting evaluation includes two steps, namely the measurement and assessment. Measurements have not provided an answer to the question, while the assessment will provide answers to questions.

the coaches train the beginners to perform by conducting regular supervision by a trainer and a training schedule which is made individual.

Indonesia’s Sport achievements is not satisfactory, and it is our responsibility to make it better if it fails. Broadly speaking, to achieve the desired performance in sports, it takes seven factors that must be met. These factors are classified into internal factors and external factors. The internal factors, among others are guidance systems and infrastructure. External factors are the psychological factors, exercise routines, trainer, physical state, as well as the techniques and skills possessed by the athlete. When all of these factors have been met, the sport achievements in Indonesia will be much better. The cooperation between the coaches with athletes in training in order to achieve optimal performance, The achievement of the desired performance in sports is considered as the maximum results from the objectives to be achieved. According to Khasan (2011) achievement is the results obtained by work tenacity.
Accomplishments include the entire realm of psychological change as a result of the experience and the student's learning process. Facilities and Infrastructure

Sports facilities can be divided into two groups:

1. Equipment (apparatus), is something that is used for example: single beam, parallel bars, rings, horses and others.
2. The equipment (device), namely:
   • Something that complements the infrastructure needs, such as: the net, flags to mark, boundary lines and others.
   • Something that can be played or manipulated by the hands or feet, for example: ball, racket, bat and others.

McKinney (in Hadisasmita, 2001:27) argued that a good coach has the following capabilities:

1. Having the ability to help athletes to actualize its potential.
2. When forming a team, based on the individual skills that have been taught.
3. Having the knowledge and technical skills.
4. Having the ability to adjust to the skill level of the intellectual athletes.
5. Ability to apply scientific principles in shaping the conditions of the athlete.
6. Hate defeat, but do not look for a victory in many ways that are unethical.
7. Have the ability to control himself in the direction of deviation profession.
8. Have the ability to perform a wide range of assessment with the participation of athletes.
9. Have the ability to always be respected by athletes and friends.
10. Having a high dedication to the profession.

The exercise program also plays an important role in coaching athletes to achieve peak performance. Conformity exercise program with the ability of the athlete will prevent athletes from sports injuries. Coaches must plan an exercise program to improve the skills and achievements by athletes as optimally as possible by observing the exercise. According Harsono (in Hadisasmita, 2001:126) in order to achieve that goal, four aspects need to be considered by coach:

1. Physical exercise
2. Exercise technique
3. Exercise tactics
4. Mental Exercise

According to Bompa (in Hadisasmita, 2001:128) the purpose of the exercise is a common goal:
1. To achieve and enhance physical development multilaterally.
2. To promote and secure the development of specific physical, according to the needs of the sport that occupied.
3. To improve and refine the techniques and strategies needed.
4. To manage the quality of willingness.
5. To ensure and secure the individual and team preparation optimally.
6. To strengthen the health level of each athlete for the prevention of injury.
7. To enhance the theoretical knowledge.

METHODS
Type of Research: Qualitative research. Denzin and Lincoln (in Moleong, Lexy, 2009: 5) argued that qualitative research is research which uses natural background, with the intention of interpreting phenomena and by way of involving the various methods that exist. According to Erman (2009: 212), a qualitative approach aims to determine the quality not the quantity that can be expressed in the form of ratings, such as: feelings, thoughts, and experience.

More types of qualitative research using data on non-numerical Data analysis was carried out aimed to describe and understand a concept or a particular object so that the research has a picture or accurate data on the "Evaluation of Management Development in East Java Province athletics club", which is about the application of the management board, management, activities, recruitment of athletes and coaches and development to be able to make this organization more developed.

Target Research
The target of this research is the chairman, treasurer, coaches, and athletes of athletics clubs in east Java province.
Source of Data
Primary Data or data obtained from observations and interviews with sources associated object under study investigators, namely the state and the general description of the management: administration, organizations, activities and determine the development application management coaching athletics club East Java province in which the organization moves in the field of sports.
Secondary Data or data in the form of documentation associated with the object under study

Data Collection Techniques
Collection of research data used are:
1. Studies Library
2. Field studies and evaluation for completeness, include:
   a. observation of Participation
   b. interview
   c. documentary

DISCUSSION
The results as measured from the 6 factors: 1) The coach and athlete recruitment, 2) staff, 3) infrastructure, 4) training program, 5) achievement, 6) finance.

1. Coach and Athlete Recruitment System
Filtering talented athletes to the athletic clubs was done in East Java through the monitoring of athletes during athletic championship which was held in the province of East Java and the selection criteria that are held by elementary, junior high, high school and public are: 5k and 10k race winners, at this time number of athletes in East Java athletic club is a total of 32 athletes with two coaches.
Coaches are recruited based on the ability to develop athletes, experienced coaches often follow the athletes in various competitions, and based on athletes performance, the coaches are chosen. The club lacks of trainers who have licences. However, efforts to improve the quality of the coach are by sending the coaches to the coaching seminars. Although coaches have no salary, just get incentives, they are very highly motivated and are able to make good athletes.
It is essential to determine a coach who can meet the criteria which is in accordance
with the standards of coaching. Quality coaches in the athletic club in East Java Province have been good enough, this is evidenced by the increase in achievement by athletes and by the application of a good workout program.

2. The Leadership System
Developments and conditions in the athletic club in East Java Province is good, proven by the formation of appropriate governance structure and has been running well. Provision in the form of benefits for athletes and the bonus for training has been done. Monitoring the conditions of exercises is not done in every workout, but only once a moth.
The constraint faced during the development is funding, every 3 month period, the board meet to discuss financial assistance and solve any problems that arouse.

3. Facilities and Infrastructure Facilities
Training activities will not run properly without good infrastructure. Currently the facilities and infrastructure is not adequate. It will make the athletes less concentrated can impose injury such as: sprains, strain etc. there are five clubs in East Java, namely Kraton athletic clubs, Bangil athletic club, Purwosari athletic clubs, athletic club Kejayan, and East Java athletic clubs. For East Java athletic club, there are 2 of the field Plumbon East Java field in the form of grass and The Taman Dayu highways. However, administrators and coaches attempt to borrow the pitch and training facilities in schools and institutions make artificial means of exercise is a form of responsibility that will facilitate the development of performance.

4. Exercise Program
Exercise program implemented by the coaches in the athletic club has been going well since the dose of exercise program is tailored to the speciality and individuality of the athletes.

5. Achievement
Athletes were tested regularly to monitor the advancement they made, once a month, and became criteria to send the athletes to a competition. The coach does not target kid athletes, since they still need to grow. Any heavy intolerable exercise will stop kid
athletes to continue their programs. Coaches should always motivate their athletes even though they did not get medals, to perfect their skill and get better results.

6. Funding and Administration
Efforts made by East Java Sport Committee to meet the needs of operational funds. The fund being promised by Regional Administrator of East Java Athletic Federation is still not enough to cover the needs of athletic club. Sometimes athletics championships held throughout East Java province can not be done. Fund should be sufficient to meet the optimal growth of training, competition, and athletic performance.

CONCLUSION AND RECOMMENDATIONS

1. Coach and Athlete Recruitment System
Qualified coaches are sufficient to increase athlete achievement and to apply a good training programs. Kid athletes are encouraged to follow coach training program even though welfare is not optimal.

2. The Leadership System
One of the important components in an association (organization) is management, where the role and function of the board in an association (organization) is to organize and manage to get the desired goal.

3. Facilities and Infrastructure
Sports facilities and infrastructure in the athletic club in East Java Province is still inadequate. Some infrastructure need improvements and new building need to be built, especially athletics stadium.

4. Training Program
Preparation of training programs should not be made arbitrary. Background of athletes, preliminary ability should be taken into account, and should be improved gradually bit by bit.

5. Achievement
observation, testing, and tryout should be done to measure the ability of the athlete to
test the advances they make. Tryout should be made at least once a month, including speciality.

6. Funding and Administration
System administration is good to ensure kid athletes to continue practice. Budget fund from East Java KONI can be obtaine in 6 month time to cover the expenses.

Suggestion

1. There is always a need how to send coaches to seminar as often as possible to increase their knowledge of recent ways of training, and welfare of coaches should be considered thoroughly.

2. There is a need for good coordination, such as holding regular meetings between managers and trainers to solve existing problems.

3. There is a need to improve infrastructure in particular field of athletics

4. There is a need to make a systematic programs according to the athlete’s need.

5. Coaches should continue to provide appropriate target for the athletes

6. Lack of funding should be handled in coordination with KONI East Java province.
REFERENCES

RAISING LEARNING ACHIEVEMENT SPRINT RUNNING EXCEED OF PLAYING APPROACH IN 7TH GRADE STUDENTS OF KISARAN 6 JUNIOR HIGH SCHOOL

Yusmawati, Devi Catur

ABSTRACTS

Generally, the purpose of this study is to improve students’ learning achievement through physical education sprint approach by implementing playing approach for the 7th grade of Kisaran 6 Junior High School. This research is conducted to obtain deep information regarding to the implementation of playing approach in teaching physical education. The design of the study is Action Research. The subject of this study is the 7th grade students of Kisaran 6 Junior High School.

This research is conducted by engaging 6 meetings in class which were divided into 2 periods, 3 meetings in each period. In the first period, the subject was given motivation based on the researcher plan and also the lesson plan. The findings of the first period action is the students can pass the assessment with the average score 70 or 60% of the student passed. The second period is conducted by giving reflection and motivation based on the lesson plan regarding to the result of the first period’s assessment. The second assessment showed the students average score is increase from 70 to 80 or 88% of the students passed.

Based on the findings, it can be concluded that (1) learning physical education sprint running can increase students’ learning achievement. (2) learning physical education sprint running can motivate students’ to actively following the learning process in class.

KeyWords : Playing Approach, Learning Achievement, Sprint Running
SPORTS MANAGEMENT IMPLEMENTATION IN EXTRACURRICULAR SPORT ACTIVITIES

Amrozi Khamidi
Gatot Darmawan
Setiyo Hartoto

Abstract

School is one institution that can create a professional athlete seeds. Cultivation of seedlings athletes performed at the unit level of education is through extracurricular sports. But the problem is less precise organization of activities (management) in order to bring in extracurricular sports to students' development. In general, the educational unit of extracurricular sports activities organized under the condition of schools (depending on the existing extracurricular coaches) is not based on interests and skills (self-developed) students. So that extracurricular sports is supposed to be followed by students who already possess basic skills / specific skills to be developed, but in reality many students are not followed by all who have skills in accordance with the selected extracurricular. This happens because the extracurricular talents / interests of students are not provided by the school. The hope is that the unit can be educational click or call now properly organized extracurricular activities. Which seeks to bring in the personal development of students through extracurricular activities are chosen.

Key words: extracurricular, sports, self improvement

Introduction

Development of extracurricular activities rely more on school initiatives. Legally, the development of extra-curricular activities have a strong legal basis, as stipulated in the Decree of the Minister to be implemented by the school, one of the decision of the Minister of National Education No. 125 / U / 2002 on the education calendar and the number of hours of study effectively at school. Setting extracurricular activities in this decision is in Chapter 5 of Article 9, paragraph 2 "in the middle of the 1st and 2nd semester of school sports and arts activities (sports and arts), field trips, learning or practice creativity competition aimed at developing a
complete education."

What matters now is an understanding of the importance of extra-curricular or extra-curricular activities are the core of, and the business school in order to provide proper facilities for the development of the student. In general, education was held to provide an environment that allows students to develop talents and abilities optimally, so that they are able to manifest itself and be fully functional in accordance with the individual needs and the needs of society. Similarly, extra-curricular activities are expected to bring in the interest of students to gain knowledge and experience on a variety of subjects at a later time useful for everyday life.

**Concept Self Development Through Student Extracurricular Activities.**

Self-development is not a subject that should be taken care of by the teacher. Self-development aims to provide opportunities for students to develop and express themselves according to the needs, talents and interests. Facilitated and self-development activities or guided counselor, teacher, or educational staff that can be done in the form of extracurricular (MONE, 2007).

Self-development is not as subjects, implies that the shape, design, and methods of self-development is not carried out as a scene just like learning to teach subject areas. However, when entered into the service of interest and talent development can not be avoided will be associated with the substance of the field of study and / or teaching materials that are relevant to their talents and interests of students and the learning scene will occur there.

Service development in the form of extracurricular implies that it will happen diversified interests and talent-based programs that require special builder services according to their expertise (MONE, 2007). This means that particular extracurricular sports extracurricular interests should be based on the student's choice,
which is then facilitated by the school to provide the builder / coach according to their talents / interests of students, so the expectations of the creation of the Indonesian people fully achieved. Indonesia fully human leads to the use of physical-spiritual aspects of matching, which allows the development dimension of healthy physical, social, emotional, mental, intellectual, and spiritual on a private student / athlete, as the following chart.

<table>
<thead>
<tr>
<th>Whole Healthy Lifestyle</th>
<th>indicators of Success</th>
<th>Learning and Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bodily Health Aspects (destination side Dikor &amp; Or)</td>
<td>Refers to persons who have a physical structure that is handsome, harmonious, balanced.</td>
<td></td>
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<tr>
<td>a) harmonious and balanced growth</td>
<td></td>
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<td>b) Skilled</td>
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<td>c) Fit</td>
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<tr>
<td>d) Fresh</td>
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<tr>
<td>2. Aspects of Spiritual Health (destination side Dikjas)</td>
<td>physical growth and development of organs in harmony and balance.</td>
<td></td>
</tr>
<tr>
<td>a) Social Health</td>
<td>Motion is getting stronger, faster, precise, flexible, coordinated, flexible, beautiful, graceful, and agile, which support the achievement of high performance in sports.</td>
<td></td>
</tr>
<tr>
<td>b) Healthy Emotionally</td>
<td>Do not have a disease, it can work and learn relatively old, and still has a spare after work and study hard.</td>
<td></td>
</tr>
<tr>
<td>c) Mental Health</td>
<td>Looks are always fresh and exciting</td>
<td></td>
</tr>
<tr>
<td>d) Healthy Property</td>
<td>Referring to the personal noble character Can work together, helping each other, openness, tolerance, and respect of others, including opponents.</td>
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<tr>
<td>Whole Healthy Lifestyle</td>
<td>indicators of Success</td>
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<td></td>
<td>Learning and Training</td>
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<tr>
<td></td>
<td>Self-controlled, tolerant, forgiving one another, mutual respect, and can express their opinions politely. Being honest, fair, disciplined, willing to sacrifice, tough, steady, independent, and responsible. Has the image of healthy living and strive to actualize the intellectual health behavior evident in his daily life, and can anticipate the game situation in determining the strategies, techniques and tactics appropriate and quick. Can take lessons and feel the pleasure as live and can actualize healthy behavior, because an abundance of grace and of the gift of God Almighty.</td>
<td></td>
</tr>
</tbody>
</table>

**Definition of Extracurricular Activities**

Extracurricular activities are part of a program of self-development activities, and is the educational activities outside the hours of subjects. Therefore, extra-curricular activities including integral part of the school curriculum. The development of self is one of the efforts to establish the character and personality of the students who conducted through counseling services, issues relating to personal, social, learning and career development as well as extracurricular activities. Extracurricular activities specifically aimed at career development that emphasizes creativity and life skills according to the needs of students. According to Mardikun (2007), extracurricular activities are extracurricular educational activities conducted outside the hours of subjects and counseling services to assist the development of students according to the needs, potential, talents, and interests through activities that are specifically organized by educators or educational personnel capable and berkewenangan The school is programmed and directed. Extracurricular activities can be fostered by a counselor, teacher or education
personnel in accordance with the field. The purpose of extracurricular activities is creating opportunities for students to develop and express themselves according to their interests, abilities, conditions, and talent possessed by the students, and do not forget to pay attention to the condition of the school students themselves.

Extracurricular activities are programmed and planned activities specifically within a certain time to meet the needs of individual students or groups, and its implementation into the curriculum. In Law No. 20 of 2003 on National Education System, Article 12 paragraph 1b which states "that every student is entitled to services according to their talents, interests, and abilities." In Permendiknas No. 22 of 2006 also mentioned about the content standards for elementary and secondary education units containing personal development of students in every academic curriculum structure facilitated and / or guided by a counselor, teacher, or educational staff.

Mardikun (2007) also stated that these types of extracurricular activities there are 4, namely:

1. Extracurricular civics,
2. Extracurricular sports,
3. Extracurricular activities and
4. Extracurricular scientific

Of the four forms of extracurricular subdivided into sections more specifically, for example extracurricular civics subdivided into extracurricular scout, and extra-special forces flag raisers. Extracurricular sports extracurricular subdivided into football, tennis, gymnastics, badminton and others. Extracurricular subdivided into extracurricular arts of dance, music, painting, and more. While scientific extracurricular subdivided into english extracurricular club, basic scientific groups and so on.

Can we know how important extracurricular activities are held at the school, given to develop the creativity, talents, and abilities of students. Vision extracurricular activities is the development of talents and interests optimally, and the growth of independence and happiness of students that is useful for yourself, family and society.

In line with the vision mentioned above, the mission will be carried out are as follows:
1) provides a number of activities that can be chosen by the students according to the needs, potential, talents, and interests; 2) conducting activities that give students the opportunity to express themselves freely through independent or group activities. As
we know from one of the extracurricular activities, extracurricular sports that can develop aspects of psychomotor, affective, and cognitive. Because through exercise, students can excel and learn to live in a society directly.

Mutohir and Lutan (the infallible, 2004) suggests there are "three pillars of sport achievements buildings that sport, school sport / sport education, sport and society". And of the three pillars of building the sport we know that exercise is not merely seeking to compete and win, but also to participate planting attitude, cooperation, community and education. Through extracurricular activities, especially sports extracurricular students can develop the creativity, talent, and ability of the aspects of psychomotor, affective, and cognitive.

**Extracurricular Management**

Extracurricular Management implemented right (as seen from the function of planning, organizing, actuating, and controlling) will be very helpful in order to make real personal development of students. Therefore, schools need to consider several things, as follows:

1. The importance of knowing the capabilities and responsibilities of students in extracurricular activities that becomes the choice.
2. The importance of the coach or trainer to find out and explore your thoughts and what is desired by the student.
3. The importance for schools to have the facilities and infrastructure that support the extracurricular activities.
4. The importance of choosing the right time for the implementation of extracurricular activities so as not to interfere with students' learning activities.

Furthermore, schools should still consider in depth the function of organizing extracurricular activities, among others:

1. The development, which is a function of extracurricular activities to develop the skills and creativity of students in accordance with the potential, talents and interests. That the student has had the talent / skill base in accordance with extracurricular be chosen.
2. Social, which is a function of extracurricular activities to develop skills and students' sense of social responsibility. That students will always have the social values of the society, the attitude of environmental responsibility, group, duties, and
so on.

3. recreational, which is a function of extracurricular activities to develop an atmosphere of relaxed, fun and enjoyable for students that support the development process.

4. Preparation of a career, which is the function of extra-curricular activities to develop students' career readiness. Students will still be able to hone the skills possessed and used as capital to enter the world of work.

Along with the above definition, it can be said that extracurricular activities are important and can be articulated into three educational sphere value (According to Taylor), namely:

1. Education is the value of a planned manner that involves consideration of a number of educational values, whether incorporated in management education and the educational curriculum. From the broadest to most narrow. Steps taken can be represented by the achievement of the vision and mission for the development of values, morals, ethics, and aesthetics as a whole dimension to the act of teacher education in making awareness of values in students.

2. Education is a situation that affects the value of development experience and awareness of the students' grades. The situation can be a good atmosphere, harmonious, orderly, familiar and quiet. In contrast, the situation may be less supportive atmosphere for student growth, for example a hostile atmosphere, chaotic, indifferent, and so on. All the educational situation affect the development of students' moral awareness, because it involves psychological considerations such as perceptions, attitudes, awareness and confidence.

3. Education is the value of instantaneous events experienced by students. This means that the value of education takes place through a number of unexpected events, instantaneous, voluntary, and spontaneity. All was not planned in advance, is not conditioned on purpose and can occur at any time. Fragments of such an event is a hidden curriculum that in the case of a particular experience can be a critical incident (critical incidents) that is able to change the order of the values and behavior of people (students).

Three scope of educational value described above suggests that the value of the students' learning process involved all the way, conditions, and educational events. Therefore, students need direct involvement out of hours face-to-face in classroom or
often referred to as extra-curricular activities.

**Principles of extracurricular activities**

In practice, extra-curricular activities should also pay attention to the following principles:

1. Individually, namely the principle of extra-curricular activities in accordance with the potential, talents, interests of each student. Therefore, it is individual, it is possible many types of extracurricular appears to be provided by the school. This is often an obstacle for schools, in addition to the funds needed too difficult management. However, the school still needs to strive to facilitate this.

2. Options, namely the principle of extra-curricular activities in accordance with the wishes of the students and followed voluntarily. From the research data showed that many schools are already managing extracurricular activities well, but is not based on the student's choice fit their talents and interests. Students are required to choose extracurricular that had been prepared by the school. So the basis of his election not on students but on the condition of the school only.

3. Active involvement, namely the principle of extra-curricular activities that require student participation in full. If the points 1 and 2 are carried out correctly, the involvement of the students will be able to be ascertained either, because it really is a pleasure / interest.

4. Fun, namely the principle of extra-curricular activities in an atmosphere that is preferred and encouraging students. Schools need to prepare skilled builder / coach exactly who could potentially provide a good method of training / fun for students.

5. The work ethics, namely the principle of extra-curricular activities that build spirit of the participants to work properly and successfully.

6. Social Benefits, namely the principle of extra-curricular activities carried out for the benefit of society.

**Event format**

There are several models of formats extracurricular activities that can be done by the school, among others:

1. Individual, the format of extracurricular activities that followed individual students.
2. The group, which is the format of extracurricular activities are followed by groups of students.
3. Classical, which followed the format of extracurricular activities by students in a class.
4. Combined, the format followed ekstraurikuler activities students between classes or between schools.
5. Field, which is the format that is followed by an extracurricular activity or a number of students through activities outside the classroom or field activities.

The core of Extracurricular Activities
Personality development of students is at the core of the development of extracurricular activities. Therefore, the mature personality profile is the main purpose of extracurricular activities. The development of a mature personality in the context of the development course of extracurricular activities in the stages of a student's ability. They are required to have the maturity and wholeness in the world scope of their occupancy as a child who is learning. They are able to develop their talents and interests, respect for others, was critical of the gap, dare to try positive things challenging, caring for the environment, to perform intellectual activities.
In the context of national education, all the way, conditions, and events in extracurricular activities should be directed to the realization of truth values universally. Therefore, in some schools, extracurricular programs integrally developed both in physical and in the experience of psychic experiences. Models of the development of extra-curricular activities should always integrally geared to reach the stages of personality development of students mature.

Closing
From the above discussion it can be concluded that:
1. Extracurricular activities are very important in education because the value of these activities students gain hands-on experience, are actively involved in these activities and provide enough time outside hours of effective learning, so that more value is accommodated through educational activities extracurricular activities.
2. The development of a mature personality profile, the student is at the core of the
development of extra-curricular activities.

3. The principle of operation of extra-curricular activities are: 1) that allows individual schools provide various types of extracurricular; 2) selection based on the talents/interests of students rather than on the type of extracurricular which only provided by the school alone; 3) the active involvement of students in any extracurricular activities; 4) fun for the students; 5) foster good morale and success, and; 6) the activities carried out for the benefit of society.

4. Schools should be a balance between academic building and character building. Extracurricular activities as a means of character building for students should be managed properly and professionally.
Reference


Law No. 3 of 2005. The 2007 Constitution of the Republic of Indonesia No. 3 of 2005 on the National Sports System,
Effect of Box Jump Training With Interval Training Method 1 : 2 and Interval 1 : 3 Against Increasing the Power

Agus Hariyanto

Abstract

The aim of this study was to determine whether there was a difference between the effect of the training box jumps with interval training method 1:2 and the training box jump with interval training method 1:3 to the increase in power. The method used was a quasi-experiment study design with pre-test post test group design. The subjects of this study were students majoring 2009 class of sports coaching education between the ages of 19-20 years, amounting to 24 people. The collected data is the result of the initial test and final test using the Test Power Power (Force plate/Accu Power Vertion 1.3).

Analysis used t-tests on paired sample t-test. The results in group 1 (treated the box jump with interval training method 1:2) between the data pre-test and post-test showed that the value of (t = 10.514) and a probability value (p = 0.000 < 0.05). In group 2 (treated the box jump with interval training method 1:3) between the data pre-test and post-test shows that the value of (t = 17.952) and a probability value (p = 0.000 <0.05). Group 1 and group 2 shows that the value of (t = 12.070) and a probability value (p = 0.000 < 0.05). Conclusion Training box jump performed by method of interval training 1:2 and 1:3 could significantly improve the power capability and training box jump with interval training method 1:2 and 1:3 gave significantly different effect on the power.

Key word: Box Jump, Interval Training

Introduction

In general, almost all sports require a physical power, especially sports games for example basketball, football, volleyball, hockey, badminton, etc, which played out in the form of individual and team. The physical power can be achieved through training, with regard to the principles of training and accuracy in choosing the type of exercise or training method.
In examination of the training, there are four aspects that must be considered in an effort to achievement of an athlete is the physical aspect, techniques, tactics, and mental aspects (Bompa, 1994; Harsono, 1988). The physical condition of the sports games are generally divided into two parts, consisting of the general physical condition (general physical conditioning) and specific physical conditions (specific conditioning) adapted to the characteristics of each sport. Good physical condition can only be achieved through hard practice and how the practice is not quite so alone, but must be specially prepared in accordance with the needs of each sport he participated in (Fox, 1993).

In some sports games, such as movement and block in the volleyball smash, slam-dunk and jump shot in basketball, and jump-smash in badminton, the physical elements of the dominant use of reactive power or the landing and take-off power, then the quality of the power limb should really be considered as the most important motor skills (Bompa, 1993).

In an effort to improve the physical condition of many methods that can be used, but the methods of practice which leads to increased endurance capacity is interval training. Within 12 weeks, the length of interval training and short interval training can physiologically improve endurance capacity, but with a short interval training is more effective to increase anaerobic capacity, so exercise with short intervals may be recommended for the physical preparation for field hockey players and sports teams another high-intensity considers that aerobic and anaerobic capacity is important (Stagno KM, et al, 2004).

For some sports such as football, badminton, hockey, basketball, rugby, tennis courts, and so forth, interval training methods may be more appropriate than the method of continuous exercise. Because the method of interval training can improve
aerobic power and improve cardiorespiratory endurance without reducing its effect in increasing the anaerobic power (Sport Fitness Advisor, retrieved July 8, 2009). The advantage of this interval training can accurately determine the load, can see progress quickly (boost energy and physical conditions and can be done more efficiently).

The exercise that leads to physical conditions, one of them is a plyometrics workout. There were a lot of variety of plyometric exercises included depth jumps, cone jumps, box jumps, jump rope, and much more. A good exercise is one that resembles the actual needs of the energy system. Training methods that lead to anaerobic energy systems development is of interval training. Until now there has been obtained specifically what kind of interval training method that can improve the physical condition necessary and in accordance with the sport in question. For this reason the study was conducted.

Objectives

The aim of this study was to determine whether there is a difference between the effect of the training box jumps with interval training method 1:2 and the training box jump with interval training method 1:3 to the increase in power.

Methods

The method used in this study is a quasi-experimental methods. Research design randomize the group pre test post test design (Nasir, 2003). Using a quasi-experimental method because the researcher can not control all the outside studied fariable that can affect the results of the research, such as: the length of time to sleep, food intake of each subject every day, other activities outside the research is conducted activities, and so on.
Subject

The subjects in this study were male student class of 2009 sports coaching education between the ages of 19-20 years, amounting to 24 people. The subjects were divided into two groups by random. Each group consisted of 12 people. Group 1 was treated Box Jump with interval training method 1:2 while the group 2 was treated Box Jump with interval training method 1:3.

Measurement

The data collected in this study is the result of the pre-test and post-test of Power. Measuring instrument used to measure power is the Power Test (Force plate/Accu Power Vertion 1.3). How to use the tool and perform the test is as follows:

1. Prepare the tool force plate.
2. Insert the USB plug into the computer.
3. Insert the power supply cord into a power outlet (220 volts).
4. Insert the RJ 45 plug into force plate.
5. Enable Power Accu software.
6. Let the tool for approximately 20 minutes so that all the sensors are on the warm and the working temperature.
7. Enter the patient name, id, and the type of test to be performed. Test Time can be set to follow the default, or it can also be set as needed.
9. Perform the measurement of the sample weight (Weight Subject). Depending on the types of tests performed, measurements can be carried too heavy a load (Loaded Weight).
10. Click start test, the sample is instructed to perform activities according to the type of tests performed (eg, vertical jump, standing broad jump, or lift weights/dumbbells).

11. After the test is finished, analyze the results of tests and do not forget to do data storage (save data).

12. To see the comparative data or data from previous samples, click on the file, patient, and select the data subject by the name of the subject that has been previously saved.

Figure 1. Force plate / Accu Power Version 1.3
Treatment

After the subjects were divided into 2 groups, the next step is to give treatment in each group. Group 1 was treated with a box jump with interval training method 1:2 and group 2 was treated box jump with interval training method 1:3. The implementation, the subject standing on a box with a length of 50 cm, width 50 cm, height 40 cm, then jump up and down a box with two feet together backwards, sideways or laterally left and right always return to the top of the box. Each return to the top of the box count 1 (one) and carried out continuously for 15 seconds with the number of repeat 16-18 times, this is called one repetition. Leap backwards, laterally right and left aside in accordance with the instructions of the wizard. Exercises performed between 4 to 5 repetitions and as many as 3 to 5 sets. Resting between repetition for interval training method 1:2 is 30 seconds and for interval training method 1:3 is 45 seconds, while the rest between sets is 5 minutes, and the rest is kind of passive rest.

Statistical Analysis

Analysis techniques in this study include the following descriptive analysis of the data, normality test using the Kolmogorov-Smirnoff test. If the normal distribution of data it will be paired sample t-test with a significance level (p ≤0.05). Statistical calculation using the statistical program assistance package for social science (SPSS) version 16

Results

1. Description of Data

The results of measurements and descriptive analysis of data pre-test variable power in the group given exercise box jump with interval training method 1:2 is the number of subjects (n = 12), the minimum value (189.00), maximum value (482.00),
(310.00), average value (230.58), and the standard deviation (37.36). The results of measurements and descriptive analysis of data pre-test variable power in the group given exercise box jump with interval training method 1:3 is the number of subjects (n = 12), the minimum value (159.00), maximum value (331.00), average value (228.83), and the standard deviation (52.53).

The results of measurements and descriptive analysis of data post-test variable power in the group given exercise box jump with interval training method 1:2 is the number of subjects (n = 12), the minimum value (205.00), maximum value (319.00), the value average (250.67), and the standard deviation (34.41). The results of measurements and descriptive analysis of data post-test variable power in the group given exercise box jump with interval training method 1:3 is the number of subjects (n = 12), the minimum value (207.00), maximum value (412.00), the value average (289.83), and the standard deviation (60.85).

The results of the measurement and descriptive analysis of difference data between a post-test to pre-test (delta) variable power in the group given exercise box jump with interval training method 1:2 is the number of subjects (n = 12), the minimum value (7.00), the maximum value (27.00), the average value (17.00), and the standard deviation (5.80). The results of the measurement and descriptive analysis of difference data between a post-test to pre-test (delta) variable power in the group given exercise box jump with interval training method 1:3 is the number of subjects (n = 12), the minimum value (47.00), maximum value (81.00), the value average (61.00), and the standard deviation (11.77). In summary it can be seen in table 1 below.
Table 1. Description of Data Power Measurement Results In 2 Groups

<table>
<thead>
<tr>
<th>Statistic</th>
<th>N</th>
<th>Range Statistic</th>
<th>Minimum Statistic</th>
<th>Maximum Statistic</th>
<th>Mean Statistic</th>
<th>Std. Error Statistic</th>
<th>Std. Deviation Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>PwrPree1</td>
<td>12</td>
<td>121.00</td>
<td>189.00</td>
<td>310.00</td>
<td>230.5833</td>
<td>10.78471</td>
<td>37.35933</td>
</tr>
<tr>
<td>PwrPost1</td>
<td>12</td>
<td>114.00</td>
<td>205.00</td>
<td>319.00</td>
<td>247.5833</td>
<td>10.02380</td>
<td>34.72347</td>
</tr>
<tr>
<td>PwrPree2</td>
<td>12</td>
<td>172.00</td>
<td>159.00</td>
<td>331.00</td>
<td>228.8333</td>
<td>15.16067</td>
<td>52.51811</td>
</tr>
<tr>
<td>PwrPost2</td>
<td>12</td>
<td>205.00</td>
<td>207.00</td>
<td>412.00</td>
<td>289.8333</td>
<td>17.56625</td>
<td>60.85128</td>
</tr>
<tr>
<td>Delta1</td>
<td>12</td>
<td>20.00</td>
<td>7.00</td>
<td>27.00</td>
<td>17.0000</td>
<td>1.67423</td>
<td>5.79969</td>
</tr>
<tr>
<td>Delta2</td>
<td>12</td>
<td>34.00</td>
<td>47.00</td>
<td>81.00</td>
<td>61.0000</td>
<td>3.39786</td>
<td>11.77053</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Normality Test

Normality test performed on each group of data, both pre-test and post-test on the dependent variable. Normality test is intended to determine whether the distribution of the data in this study are not normally distributed or as a prerequisite parametric statistical tests. Statistical test for normality using the Kolmogorov Smirnoff test. The determination of whether or not the distribution of the normal data using a significance level (α = 0.05) or (p < 0.05). Criteria testing, if the probability value (p > 0.05), the distribution of data is considered normal, and if the probability value (p < 0.05), the distribution of the data in this study is not considered normal.

Results of normality test of data distribution both in the pre-test group box jump with interval training method 1:2 and with the interval training method 1:3 are presented in Table 2 below.
Table 2. Results of Normality Test Pre-test data

<table>
<thead>
<tr>
<th>Groups</th>
<th>Dependent variable (power)</th>
<th>Description</th>
<th>Status Normality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box Jump 1:2</td>
<td>0.520</td>
<td>P &gt; 0.05</td>
<td>Normal</td>
</tr>
<tr>
<td>Box Jump 1:3</td>
<td>1.000</td>
<td>P &gt; 0.05</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Results of normality test of data distribution both in the post-test group box jump with interval training method 1:2 and with the interval training method 1:3 are presented in Table 2 below.

Table 3. Results of Normality Test Post-test data

<table>
<thead>
<tr>
<th>Groups</th>
<th>Dependent variable (power)</th>
<th>Description</th>
<th>Status Normality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box Jump 1:2</td>
<td>0.705</td>
<td>P &gt; 0.05</td>
<td>Normal</td>
</tr>
<tr>
<td>Box Jump 1:3</td>
<td>0.986</td>
<td>P &gt; 0.05</td>
<td>Normal</td>
</tr>
</tbody>
</table>

3. T-test

From the calculation of the t-test statistics (paired sample t-test) in group 1 (one) were treated the box jump with interval training method 1:2 between the data pre-test and post-test shows that the value of (t = 10.514) and a probability value (p = 0.000 < 0.05). This indicates that there is a significant effect of training box jumps with interval training method 1:2 to increase power. In group 2 (two) were treated the box jump with interval training method 1:3 between the data pre-test and post-test shows that the value of (t = 17.952) and a probability value (p = 0.000 <0.05). This indicates that there is a significant effect of training box jumps with interval training method 1:3 to increase power. While the between group 1 and group 2 shows that the value of (t = 12.070) and a probability value (p = 0.000 < 0.05). This suggests that
there are differences in the effect of significantly between group 1 and group 2 to increase power.

**DISCUSSION**

Box jump is one type of plyometric exercises. Plyometric term was first coined in 1975 by Fred Wilt, an American citizen. Plyometric is derived from the Latin meaning plyo and metrics measurable improvement (Chu, 1998). Based on some of the figures that define the notion of plyometric can be explained as follows: plyometric exercises are exercises that allow muscles to reach maximum strength in a short time. Another name is the plyometric stretch shortening cycle (Chu, 1998; Diallo, 2001). According to Radcliffe and Farentinos (1985) plyometric exercise is an exercise that has specificity, ie muscle contraction which is very strong response and dynamic loading or rapid strain of the muscles involved.

The implementation of box jump is preceded by standing on the box measuring 50 cm long, 50 cm wide, and 40 cm high, then jump up and down the box with two feet together backwards, sideways or laterally left and right always return to the top of the box. Each return to the top of the box is calculated and carried out continuously for 15 seconds (one repetition) by the number of repeat 16-18 times. Direction leap backwards, laterally right and left aside in accordance with the instructions of the wizard.

Subjects in the exercise were directed to follow guides and always jumps back to the top of the box, thus jumping movement of the subject when it hits the floor immediately make the leap to the top of the box. This movement can stimulate the subject of exercise to an increase in power. During the execution of the exercise
heart rate is monitored manually whether in doing the exercises included in the training zone or not. Of the work manually, the subjects entered the exercise zone.

Box jump training given to the subject of the research carried out by the method of interval training. Interval training is an exercise that is spersed between loading exercises with rest periods. In interval training can be done with high intensity and low intensity, depending on the physical condition needs to achieve. Steven M. Cohen (2008) stated that high intensity interval training can be defined as a form of competitions or movements in the short intense exercise performed at intervals followed by low-intensity exercise as a recovery of the interval.

A variety of interval training program that corresponds to the energy system according to Fox (1993), Bompa (1994), Bower (1992) can be seen in the table 4 below:

<table>
<thead>
<tr>
<th>Major Energy Sistem</th>
<th>Training Time (Min:Sec)</th>
<th>Repetition Per Workout</th>
<th>Sets Per Workout</th>
<th>Repetition Per Set</th>
<th>Work Relief Ratio</th>
<th>Type of Relief Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATP-PC</td>
<td>0:10</td>
<td>50</td>
<td>5</td>
<td>10</td>
<td>1:3</td>
<td>Res-Relief</td>
</tr>
<tr>
<td></td>
<td>0:15</td>
<td>45</td>
<td>5</td>
<td>9</td>
<td></td>
<td>Res-Relief</td>
</tr>
<tr>
<td></td>
<td>0:20</td>
<td>40</td>
<td>4</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0:25</td>
<td>32</td>
<td>4</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATP-PC</td>
<td>0:30</td>
<td>25</td>
<td>5</td>
<td>5</td>
<td>1:3</td>
<td>Work-Relief (e.g. Light top mild exercise)</td>
</tr>
<tr>
<td></td>
<td>0:40-0:50</td>
<td>20</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1:00-1:10</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1:20</td>
<td>10</td>
<td>2</td>
<td>5</td>
<td>1:2</td>
<td></td>
</tr>
</tbody>
</table>
From the table 4 above can be made form of exercise that is tailored to what the energy system will be developed. This form of exercise should be adjusted to the intensity of work, a long phase of work in progress or distance covered in a working phase.

The analysis showed that in group 1 were given exercise box jump with interval training method 1:2 and group 2 were given exercise box jump with interval training method 1:3 there is a significant difference between the pre-test to post-test on the variable power. Thus it can be preted that the type of exercise box jump with interval training method 1:2 can significantly enhance the ability to power an average increase of 17.00 watts, while exercise box jump with interval training method 1:3 can significantly improve the power capability an average increase of 61.00 watts.

The elements of physical condition of power, strength, and speed there is a relationship of inter-related and affect positively (Bompa, 1999). As one of the types of exercises that can be used to increase power is plyometric, and one of its kind is the box jump. This is in accordance with the opinion Ebben (2007) which states that if an increase in variables such as speed, jumping ability, and agility is the purpose of the exercise, it is a type of plyometric exercises most suitable. That's because plyometric exercise is an exercise that has specificity, ie a very strong muscle contraction which is the response and dynamic loading or rapid strain of the muscles involved. So
plyometric exercises when applied to interval training method 1:2 and 1:3 can increase the power.

CONCLUSION

Based on these results it can be concluded that the

1. Training box jump is performed by the method of interval training 1:2 and 1:3 can significantly improve the power capability.

2. Training box jump with interval training method 1:2 and 1:3 gave significantly different effect on the power.
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Ergogenic property of the insulin-sensitizing ginsenoside Rg1

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Short title: Ergogenic property of Rg1

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Abstract

To standardize ginseng as a reliable nutraceutical is difficult, because of its changing ginsenoside profile with type, season, and cultivated soil. Here we found that ginsenosides Rb1 increased, whereas Rg1 decreased glucose levels of rats under oral glucose challenge. Unexpectedly, such opposing effects diminished as the dose increased. In humans, Rg1 enhanced meal tolerance and insulin sensitivity after exercise, concurrent with faster glycogen replenishment and increased citrate synthase activity in skeletal muscle (P<0.05). Rg1 failed to improve muscle strength and aerobic capacity (VO_{2max}), but increased exercise time to exhaustion (80% VO_{2max}) by ~20% (P<0.05). Rg1 also eliminated the increase in thiobarbituric acids reactive substance (TBARS), shift in inflammatory balance (P<0.05), and decrease in p62 of skeletal muscle resulting from 60 min of exercise. These results suggest that Rg1 can improve blood glucose control and robustly protect humans against exercise-induced oxidative stress via minimizing unwanted oxidative attrition on cell lipid components.

Key words: ginseng, fatigue, autophagy, inflammation, TNF-alpha, IL-10
**Introduction**

As a popular worldwide herbal supplement, ginseng has been alleged to have performance-enhancing properties for thousands of years. However, previous scientific studies present mixed results\(^1\)-\(^4\). One major limitation in ginseng research is its inconsistent ginsenoside profile due to its variant type, harvesting season, and cultivated soil\(^5\),\(^6\). To circumvent such shortcomings, bioactive components of ginseng, which can modulate metabolism and physical performance, need to be identified and studied independently in order to standardize ginseng and make it a reliable ergogenic or health-promoting nutraceutical.

Ginsenosides, a class of glycosylated steroids found in many types of ginseng, have been the major target of ginseng research in recent years. To date, empirical evidence regarding what ginsenosides from ginseng can improve human physical performance is lacking. It has been documented in one animal study that 4 days of ginseng saponin supplementation (10 and 20 mg/kg/day) can significantly increase endurance performance of rats exercising at approximately 70% of maximal oxygen consumption (\(VO_{2\text{max}}\)). Ginseng saponin devoid of Rg1 and Rb1 failed to demonstrate this positive effect, suggesting that these major steroidal compounds of ginseng may be responsible for the performance-enhancing attribute\(^7\).

Exercise challenge inevitably generates unwanted molecular attrition on cellular lipid components as a result of increasing metabolic stress. Increasing lipid peroxidation is widely known to result in impaired mitochondria function and carbohydrate metabolism\(^8\),\(^9\). In a previous study involving race horses, a close association was reported between pre-competition TBARS (biomarker of lipid peroxidation) level and endurance performance, suggesting that accumulation of
oxidized lipid components can undermine physical performance. Therefore, the capability to preserve the native structure of cellular lipid components during intensive exercise is essential for maintaining uncompromised metabolic function, physical performance, and post-exercise recovery/adaptation. Although the free radical scavenging effect of ginseng has been documented in several in vitro studies, the capability of select ginsenosides from ginseng to prevent or limit exercise-induced oxidative damage in humans is currently unavailable.

Oxidative damage of cells can trigger two interlocking mechanisms designed to eliminate unhealthy cellular modifications: autophagy (at cellular level) and inflammation (at tissue level). Autophagy is a catabolic response that functions to clear damaged cytoplasmic components of a cell; whereas inflammation works at a higher level to eliminate unhealthy cells and remodel the challenged tissue. Inflammation occurs when the stress-induced cytoplasmic damage exceeds the autophagic capability of the cell. Moderate autophagy stimulated by aerobic exercise increases mitochondria number due to a positive balance between mitochondria biogenesis and mitophagy. However, excessive autophagy can result in negative outcome in skeletal muscle.

Autophagic activity can be monitored by decreased p62 accumulation. This protein is an intracellular adaptor essential for life and death decisions of a cell, and which is important in the regulation of inflammation. The degree of p62 down regulation reflects the demand on clearing intracellular damaged components caused by a traumatic challenge. Several autophagic proteins, termed ATG, participate in the formation of the autophagosome to sequester damaged cytoplasmic components before its delivery to the lysosome for destruction. Among these proteins, ATG5 and ATG7, can switch autophagy to inflammation. Once inflammation is triggered,
pro-inflammatory cytokines TNF α and IL-6 are released from challenged tissue to orchestrate the local inflammation events. In contrast, the anti-inflammatory cytokines IL-10 inhibits the inflammation process when the cell population of the tissue is sufficiently renewed. Thus, autophagic activity and inflammatory balance can reflect the health status or robustness of skeletal muscle against an acute physical challenge. In this study, autophagic and inflammatory responses were measured to evaluate the influence of ginsenoside administration on the coping capability of human skeletal muscle against an exercise challenge.

In the current study, we hypothesized that ginsenosides, which can enhance insulin sensitivity, will improve physical performance, based on the fact that carbohydrate is the major fuel supporting ATP synthesis during high intensity exercise. Approximately 85% of postprandial glucose is taken up by skeletal muscle and most of this glucose is stored in form of glycogen. The amount of glycogen content in human skeletal muscle correlates linearly with endurance performance. In our preliminary study, Rb1 and Rg1, representing the two major ginsenosides from Panax Notoginseng, were tested. We found that Rg1 has insulin-sensitizing properties, which can improve glucose tolerance in rats. Therefore, several randomized, double-blind, placebo-controlled, crossover human trials were followed. We evaluated the ergogenic properties of Rg1, including muscle strength, aerobic fitness, and endurance performance at high intensity. Training adaptation markers in skeletal muscle, including post-exercise citrate synthase activity and glycogen storage rate from biopsied vastus lateralis were determined immediately and 3 h after a 60-min exercise (70% VO2max) in conjunction with a meal tolerance test. Biomarkers of an autophagic response and for inflammatory balance were also measured in the exercised human skeletal muscle.
Results

An oral glucose tolerance test (OGTT) was performed in rats fed ginsenosides (Figure 1). Here we found a low dose of Rb1 (0.1 mg/kg) increased the blood glucose response during an OGTT when compared against vehicle (Figure 1A), while the same dose of Rg1 showed an opposing effect (Figure 1B). As the dose increased, the polarized responses diminished. The chemical structure of Rb1 and Rg1 are similar and illustrated on Figure 1C. To confirm whether the long-term effect of Rg1 is consistent with the observed acute effect, a 10-week administration of Rg1 was performed (Figure 2). Comparisons were made before the first treatment and 12 h after the last Rg1 treatment for both Rg1 and vehicle groups. The glucose tolerance of the vehicle group was not altered after the long-term treatment (Figure 2A). Similar to the result of our acute rat study, a significant decrease in the blood glucose response was observed during a glucose challenge after 10 weeks of Rg1 treatment (Figure 2B). Significant changes in the insulin response during the OGTT for both vehicle (Figure 2C) and Rg1 (Figure 2D) groups were not detected after the 10-week treatment. These results indicate that the glucose lowering effect of Rg1 is associated with an improvement of whole-body insulin sensitivity (Figure 2E).

Several human trials were performed to determine the ergogenic properties of Rg1. The first human trial evaluated the effect of Rg1 on glycogen recovery in post-exercised skeletal muscle. Rg1 was orally administered to young men one night and one hour before a 60-min exercise at 70% VO2max. A meal tolerance test (high carbohydrate meal) was performed during a 3-h recovery period (Figure 3). Glycogen accumulation rate was assessed by measuring glycogen concentration on two biopsies from the vastas lateralis at 0 and 3 h after the exercise. Significantly lowered glucose (Figure 3A) and insulin (Figure 3B) levels following the post-exercise meal were
observed after Rg1 administration compared to placebo. The rate of glycogen depletion was not significantly different between the Rg1 and placebo trials (Figure 3C). However, a significantly accelerated rate of glycogen recovery in exercised skeletal muscle was observed after Rg1 administration (Figure 3D).

We performed two additional double-blind randomized placebo controlled crossover trials to evaluate the effect of Rg1 on muscle strength in weight lifters (Table 2) as well as aerobic fitness and cardiovascular endurance in untrained young men (Table 3). No significant effect of Rg1 was observed for isokinetic leg extension or flexion strength at two rotational speeds (Table 2A and 2B). There was also no significant difference in VO$_{2\text{max}}$ between the Rg1 and placebo trials. However, compared with placebo (31.8±5.0 min), Rg1 significant increased exercise time to exhaustion (38.3±6.7 min) during a cycle ergometer test at 80% VO$_{2\text{max}}$ (Table 3).

Results from biopsied muscles reveal that Rg1 supplementation induced a significant increase in muscle citrate synthase activity within only 3 h following exercise at 70% VO$_{2\text{max}}$ (Figure 4), whereas this increase was not detected for the placebo trial. Blood myoglobin levels, which mirror acute exercise-induced muscle damage, did not appear to increase for either the Rg1 or placebo treatments during or following 1-h cycling exercise at 70% VO$_{2\text{max}}$ (Figure 5). Oxidative damage marker TBARS in exercised human muscle increased significantly during the placebo trial. However, this increase was eliminated completely during the Rg1 trial (Figure 6).

Shift in inflammatory balance of human skeletal muscle against an acute bout of exercise at 70% VO$_{2\text{max}}$ was evaluated by tissue mRNA changes for IL-10, TNF-α, and IL-6 using quantitative PCR (Figure 7). Exercise significantly lowered IL-10 mRNA levels by ~50% (Figure 7A, P< 0.05), whereas the increase in TNF-α did not
reach statistical significance (Figure 7B). This pro-inflammatory shift in balance induced by exercise was reversed by Rg1 administration. A delayed increase in IL-6 mRNA was found 3 h after exercise (Figure 7C, P< 0.05) without an observable difference between Rg1 and placebo treatment. Exercise significantly increased PGC-1α and GLUT4 mRNA (P<0.05). However, no significant differences in PGC-1α (Figure 7D) or GLUT4 (Figure 7E) mRNAs were found between Rg1 and placebo treatments.

The autophagic response to exercise was also measured under the same exercise challenge (Figure 8). In the placebo trial, p62 protein decreased significantly during 3-h post-exercise recovery period (Figure 8A). This decrease was completely eliminated during the Rg1 trial. Muscle LC3-I (Figure 8B) and LC3-II (Figure 8C) protein levels were not significantly altered by exercise and no group differences were found between Rg1 and placebo. ATG5 and ATG7 mRNA levels were also measured in exercised human muscle. Similar to the p62 response, marginally less ATG5 mRNA elevation in the Rg1 trial was observed compared to that in the placebo trial (Figure 8D). No group difference was found in ATG7 mRNA response against exercise (Figure 8E).

Discussion

Optimization of physical performance demands effective metabolic function in the maintenance of ATP regeneration, energy replenishment, and tissue repair during and after exercise. Ginseng is a popular herbal supplement that has often been claimed to have performance-enhancing attributes. However, previous studies have provided conflicting results. An inconsistent ginsenoside profile of ginseng associated with its type, growth season and the soil in which it is grown represents a major limitation,
and probably accounts for most of the conflicting results surrounding ginseng research. Because carbohydrate is the main fuel supporting intensive exercise, animal studies were first undertaken to select a ginsenoside of *Panax Notoginseng*, which can enhance glucose tolerance in order to address the question whether such a ginsenoside can improve physical performance and accelerate post-exercise recovery in humans. In our preliminary research, we found that different ginsenosides from the same plant with similar chemical signature produced contrasting results on glucose tolerance in rats. Intriguingly, increasing dosage of ginsenosides did not increase, but attenuate the observed polarized effect, suggesting a hormetic property of ginsenosides *in vivo*. From our preliminary work, we identified Rg1 as a ginsenoside, which can acutely enhance glucose tolerance in rats. Results from our 10-week intervention study confirmed that Rg1 is an insulin-sensitizer, which can significantly improve glucose tolerance during long-term use. This animal work revealed a new perspective regarding the importance of the ginsenoside profile of ginseng and atypical dose-response relationship of ginsenosides on metabolic actions, and establishes the basis for pursuing human trials to characterize the ergogenic properties of Rg1.

In two separate human trials, Rg1 failed to increase muscle strength in weight lifters and aerobic capacity in untrained men. Nonetheless, participants orally received Rg1 exhibited significantly enhanced endurance performance at high exercise intensity. They were able to undertake approximately, compared with placebo, 20% additional work on a cycle ergometer. This improvement appeared to be associated, in part, with an increase in molecular stability of cellular components in skeletal muscle during exercise. Exercise unavoidably increases oxidative stress on cellular structures, as shown by increased TBARS, which can result in a transient weakening of cellular
function. TBARS are a byproduct of lipid peroxidation, which reflects the magnitude of oxidative damage of cellular lipid components during increased metabolism. Here we observed relative to a placebo control a suppressed accumulation of oxidative damage in exercised skeletal muscle after Rg1 administration, coincident with enhanced meal tolerance, glycogen accumulation, and mitochondria enzyme activity during recovery. Increasing lipid peroxidation is well-known to cause a fundamental impact on metabolic function, such as decreased insulin sensitivity of skeletal muscle and deterioration in mitochondria function. Thus, results of our human trials suggest that improved endurance performance and accelerated functional recovery of skeletal muscle are, in part, associated with the buffering action of Rg1 against oxidative stress induced by exercise.

Oxidation-specific epitopes are associated with danger-associated molecular patterns (DAMP) recognized by receptors of innate immunity to initiate inflammation. Along with an increase in TBARS following 1 h of exercise, we found a significant decrease in p62 protein and IL-10 mRNA in human skeletal muscle, indicating a concurrent elevation of autophagic activity and potentiation of an inflammatory response. Rg1 eliminated these responses. The elimination of this pro-inflammatory shift by Rg1 administration appeared to be associated with elimination of TBARS after exercise. Inflammation is a mechanism of multicellular organisms to initiate the local healing process in response to traumatic stimuli by removing unhealthy cells and triggering repopulation of the tissue. IL-10 is an anti-inflammatory cytokine that functions to inhibit inflammation when the tissue is healthy. The observed decrease in IL-10 following Rg1 administration reflects a pro-inflammatory shift in balance, when the pro-inflammatory cytokine TNF and IL-6 of the muscle were unchanged or increased. The result of the study demonstrates that Rg1 can modulate inflammation...
status of human skeletal muscle after an acute bout of exercise. Thus, this observed response after Rg1 administration might be associated with a decreased production of oxidation-specific epitopes in exercised skeletal muscle.

A reduced exercise-induced autophagic response after Rg1 administration may explain its action in preventing a significant decline in IL-10 mRNA during exercise. At the cellular level, autophagy is a catabolic mechanism for degrading dysfunctional cellular components and bringing the cell back to normal, which will in turn avoid inflammation. In contrast, excess autophagy causes inflammation. Recently, exercise has been demonstrated to enhance baseline autophagy for clearing accumulated damaged cytoplasmic components and mitochondria. This process is involved with down regulation of p62. In the present study, we found that p62 was down regulated after exercise in human muscle as well, and this stress response was attenuated after Rg1 administration. Attenuation of autophagic ATG5 mRNA transcription following exercise by Rg1 supplementation agrees with the p62 results. Taken together these results indicate that exercise-induced proinflammatory events can be prevented by Rg1 administration.

Previous studies have demonstrated that autophagy is essential for an increase in oxidative enzyme activity following exercise training. However, we observed an unexpected early increase in muscle citrate synthase activity following exercise, while autophagy was attenuated by Rg1 supplementation. An increase in citrate synthase activity in skeletal muscle is widely considered an indication of increased mitochondria density following exercise training. This adaptive response is not normally observed during 3 h of post-exercise recovery. Therefore, Rg1 administration may stabilize the infrastructure of muscle cells after exercise reducing the need for tissue repair and paving the way for a faster functional recovery and
adaptation. Mitochondria density is the result of the dynamic balance between mitophagy and mitochondria biogenesis. Alternatively, it is also possible that Rg1 accelerated autophagy in advance and thus shorten the time required for turnover of intracellular components. In our study, Rg1 was delivered 12 h and 1 h prior to the exercise challenge. Muscle biopsies were performed immediately and 3 h after exercise. Thus, we cannot preclude the possibility that Rg1 triggered the exercise-induced autophagy event early in recovery and resulted in a faster return to normal state, which resulted in a rapid increase of mitochondria compared to placebo.

It is unclear how Rg1 protects lipid components of skeletal muscle against exercise-induced oxidative stress. A previous *in vitro* study reported an increased membrane fluidity after Rg1 treatment. Decreased membrane fluidity is associated with increased oxidative stress. We propose that incorporation of the bulky steroid moiety of Rg1 into cellular membrane lipid may enhance mechanical stability of the cell and mitochondrial membranes against temperature shifts and ionic leakage across membranes during a changing rate of oxidation. Temperature shifts typically occurs during and after exercise. Thus, molecular stabilization of membrane lipid structures after Rg1 supplementation may increase the robustness of skeletal muscle to withstand the challenged created by temperature shift during exercise.

**Conclusions**

The results of this study provide support for the idea that ginsenosides that improve insulin sensitivity may offer ergogenic benefits for humans. The accelerated post-exercise recovery after Rg1 pre-treatment appears to be mediated by its capability to buffer exercise-induced oxidative stress. This is evidenced by the
observation that Rg1 suppressed an increase in TBARS, inhibited autophagic activity, and attenuated a pro-inflammatory shift caused by aerobic exercise. In addition, the observed contrasting effect of Rb1 and Rg1 from the same ginseng indicates the importance of the ginsenoside profile of ginseng for standardization of this herbal. Since it is unclear how many ginsenosides or other chemical components found in ginseng may confer opposing effects of Rg1, it would be premature to conclude that all types of ginseng containing the same amount of Rg1 would produce equivalent metabolic effects. Furthermore, simply increasing the dosage of ginseng to increase Rg1 dosage may not prove to be beneficial and could actually be harmful.

**Materials and Methods**

**Ginsenosides Rb1 and Rg1**

Rb1 and Rg1 (NuLiv Science, Walnut, CA, USA) are major ginsenoside compounds of *Panax Notoginseng*, which have common steroid core structure and covalently bonded with several sugars (Figure 1C), also existing in most species of ginseng. Because of its hydrophobic property, Rb1 and Rg1 were solubilized in 2% ethanol vehicle solution for rat experiments. For human trials, each Rg1 capsule contains 5 mg of Rg1 with flour powder, whereas placebo capsule contains same amount of flour.

**Animal Experiments**

Male Sprague-Dawley rats weighing ~150 g were housed in a room maintained on a 0800 to 2000 h light cycle and at a temperature of 24°C for 2 weeks before OGTT and ITT experiments. The rats were allowed free access to water and chow.
(PMI Nutrition International, Brentwood, MO, USA) until 12 h before OGTT and ITT experiments.

Animal experiments were performed for screening the major ginsenosides, which could possibly improve glucose tolerance, a functional measure of carbohydrate metabolism. The selected ginsenoside was then subjected for human trials. Ginsenosides Rb1 and Rg1 were orally delivered one night and 1 h before testing. We found decreased glucose levels during OGTT at the lowest dose of Rg1 (Figure 1). To confirm whether this acute effect could be sustained for a longer period, the same daily treatment was performed for 10 weeks. OGTT and ITT were performed 12 h after the last oral intubation under overnight fasted conditions.

All procedures were approved by the local Animal Care and Use Committee and conformed to guidelines for the use of laboratory animals.

To determine the acute effect of ginsenoside, 48 rats were randomly assigned to one of 3 different treatment groups: Rb1 (N=16), Rg1 (N=16), and vehicle (N=16) groups. For each group, rats were evenly subdivided into 4 groups at doses ranging from 0.1 mg/kg to 100 mg/kg body weight (designated 1X, 10X, 100X, 1000X).

Blood samples were taken from a tail vein and analyzed for glucose and insulin. For the OGTT, rats orally received a glucose solution (1 g per kg body weight). Blood samples were collected thereafter to determine the blood glucose and insulin responses. For the ITT, insulin (0.3 U per kg body weight) was injected in the intraperitoneal cavity to obtain its glucose lowering effect as a measure of insulin sensitivity.

Human Trials
Based on the animal results, 4 human trials were conducted to evaluate the ergogenic properties of Rg1. Trial 1 (N= 8, male weight lifters, aged 22.8±0.5 years, weight 81.3±7.3 kg, height 163.5±2.5 cm) was designed to measure quadriceps muscle strength. Trial 2 (N= 14, untrained healthy men, age 21.1±1.3 years, weight 72.6±7.8 kg, height 176.6±1.0 cm, VO$_{2\text{max}}$ 3.1±0.2 L/min) was designed to measure glycogen recovery of skeletal muscle and meal tolerance during post-exercise recovery. Trial 3 (N= 12, untrained healthy men, aged 22.2 ± 0.6 years, weight 72.1±2.3 kg, height 175.2±0.1cm, VO$_{2\text{max}}$ 3.6±0.3 L/min) measured aerobic fitness (maximal oxygen consumption) and endurance performance (cycling time to exhaustion at 80% VO$_{2\text{max}}$). Trial 4 (the same participants as Trial 3) measured oxidative damage (TBARS), citrate synthase activity, and autophagic/inflammatory markers of skeletal muscle following 1 hour of exercise at 70% VO$_{2\text{max}}$.

Effects of Rg1 were always evaluated in a randomized, double-blind, placebo-controlled, crossover design with a 4-week washout period to remove possible residual effects of oral ginsenoside intake. Participants received placebo or Rg1 under supervision of a research assistant to ensure subject compliance. One night prior to the exercise challenge (~12 h), all subjects were instructed to take a standard diet (plus can of Ensure) along with their first dose of either Rg1 or placebo capsule provided by a research assistant. For each human trial, subjects consumed a bottle of mineral water on the day of the experiment, and 1-h prior to the exercise challenge subjects received their 2$^{nd}$ dose of Rg1 or placebo.

Human trials were approved by Institutional Review Board of the local ethics committee. This study was conducted in accordance with the guidelines in the Declaration of Helsinki. All subjects were well informed of the potential risks and
signed an informed consent. Exclusion criteria were history of musculoskeletal injury or receiving medication in the previous 1 month.

**Muscle Biopsy**

For Trial 2 and 4, all human subjects performed an acute bout of 60-min of cycling at 70% VO_{2max} and were observed during their first 3 h of recovery. Vastus lateralis samples were collected using a percutaneous biopsy technique under local anesthesia. An 18-G Temno disposable cutting needle (Cardinal Health, McGaw Park, Illinois, USA) was inserted into the vastus lateralis positioned at 1.0-1.5 cm depth, ~20 centimeter proximal to knee cap. Muscle samples were taken at baseline (2 weeks before the exercise challenge), immediately after and 3 h after exercise.

**Quadriceps Muscle Strength**

The acute Rg1 effect on muscle strength was evaluated using a Biodex isokinetic dynamometer (Biodex Medical Inc., Shirley, NY, USA). Participants did not weight train for 10 days before the study. Peak torque occurring during knee extension and flexion of the dominant leg of the subjects was measured at two speeds (60° and 180°/second). Peak torque (Nm) represents the single highest torque output of 3 consecutive maximal repetitions.

**Maximal oxygen consumption (VO_{2max})**

VO_{2max} and maximal HR were measured one week before exercise challenges on a Monark cycle ergometer (Monark Ltd, Varberg, Sweden), using a continuous incremental cycle ergometer protocol. This protocol consisted of a 5-min warm up and incremental increases in workload of 60 W every 3 min until exhaustion. VO_{2max} was verified by a respiratory exchange ratio (RER) of greater than 1.1 and a
plateauing of VO$_2$ with increasing workload. O$_2$ and CO$_2$ concentrations of inspired and expired gases were measured with a MetaMax I system (Leipzig, Germany).

**Endurance Performance**

We determine the influence of Rg1 supplementation on aerobic endurance performance. Participants were asked to pedal on the same Monark cycle ergometer used for their VO$_{2\max}$ measurement until exhaustion at 80% VO$_{2\max}$. During the exercise test, subjects were asked to keep the rotational speed at 60 rpm to their best effort. After warm-up for 5 min at a work rate (watt) equivalent to 60% VO$_{2\max}$, the work rate was increased to 80% VO$_{2\max}$. Fatigue was defined as the point at which subjects could no longer maintain 60 rpm on the cycle ergometer.

**Meal Tolerance Test**

Meal tolerance was evaluated after the exercise challenge along with measurement of muscle glycogen storage. A meal consisting of 70% carbohydrate (glycemic index: 77; total energy intake: 689 Kcal) was received by all participants (2 g carbohydrate per kilogram of body weight). This meal contained corn flakes (Kellog’s Ltd, Manchester, UK), skimmed milk, bread, jam and water (carbohydrate, 140.1 g; protein, 19.7 g; fat, 5.5 g) prepared by a registered dietitian. Biopsied muscle samples were obtained immediately and 3 h after exercise for determination of post-exercise recovery in glycogen, oxidative damage (TBARS), citrate synthase activity, and autophagic/inflammatory markers. Blood glucose and insulin were also determined during the 3-h recovery.
Blood Analysis

For the meal tolerance test during human trial, a 20-G polyethylene catheter (Jelco, Tampa, FL, USA) was placed in an antecubital vein for blood sampling. Blood samples were then taken before and after meal consumption. During recovery, blood samples were also collected every 30 min for 180 min. The catheter was kept patent by flushing with a small amount of saline solution containing heparin (10 IU/ml) following each sample collection. Blood samples were collected into fluoride heparin and plasma tubes. Plasma was obtained after centrifuging at 4°C for 10 min at 3000 rpm and was stored at -80°C before analysis. Blood glucose was determined by an automated glucose analyzer (YSI Life Sciences, Yellow Springs, OH, USA). Plasma insulin levels were determined by using the radioimmunoassay method with a commercial kit (Baylor Diagnostics, Tarrytown, NY, USA) according to the manufacturer’s instructions. For rat experiments, insulin was measured using a Mercodia Rat Insulin Kit (Mercodia Corporation, Uppsala, Sweden).

Glycogen Assay

A small amount of skeletal muscle from the vastus lateralis muscle was dissolved in 1 N KOH at 75°C for 30 min. Dissolved samples were neutralized by glacial acetic acid. They were incubated overnight in acetate buffer (0.3 M sodium acetate, pH to 4.8) containing amyloglucosidase (Boehringer Mannheim, Indianapolis, IN) for degradation of glycogen into glucose. The reaction mixture was neutralized with 1 N NaOH. Samples were then analyzed by measuring glucosyl units by the Trinder reaction (Sigma, St. Louis, MO).
Western Blotting Analysis

The protein levels of p62, LC3-I and LC3-II in the muscle samples were estimated by Western blotting analysis. The protein concentration of the muscle homogenate was determined using a BioRad protein assay reagent (Richmond, CA, USA) according to the manufacturer’s instruction. Then the sample homogenates were diluted 1:1 with Laemmli sample buffer (125 mM Tris, 20% glycerol, 2% SDS, 0.008% bromophenol blue, pH 6.8). Afterwards, 75 µg of protein from each sample was subjected gel electrophoresis and the proteins transferred to a polyvinylidene fluoride membrane (PVDF) as described in our previous studies. The antibodies were obtained from Cell Signaling Technology, Inc. (Temecula, CA, USA).

Quantitative Polymerase Chain Reaction (qPCR)

Total RNA from biopsied muscle tissue was extracted using RNeasy Fibrous Tissue Mini Kit (Qiagen, Valencia, CA, USA) according to the manufacturer's instructions. The extracted RNA was dissolved in RNase free water. Reverse transcription reactions were performed on extracted RNA using an iScript cDNA synthesis kit (Bio-Rad Laboratories, Inc., Hercules, CA, USA) in a reaction volume of 40 µl. Primers and TaqMan probes were designed using BioRad Beacon Designer (BioRad Laboratories, Hercules, CA, USA), listed in Table 1. All primers and TaqMan probes were supplied from the same vendor (Sigma Proligo, Singapore). We quantified gene expression against 18S rRNA as a reference gene, using a critical threshold (CT) method using the MyiQ real-time PCR detection system (BioRad Laboratories, Hercules, CA, USA). A CT value reflects the cycle number at which the DNA amplification is first detected. PCR amplification was carried out in 25 µl reactions of iQ supermix, 400 nM forward primer, 400 nM reverse primer, and 300
nM TaqMan probe. Each reaction was made up to volume with DNase-free water. Fold changes against control were calculated using the $2^{-\Delta\Delta CT}$ method.

**Oxidative damage (Thiobarbituric acid reactive substances)**

Homogenized muscle samples were diluted for TBARS measurement as a byproduct of lipid oxidation. TBARS was determined by ELISA using a TBARS assay kit (Cayman Chemical Company, Ann Arbor, MI, USA).

**Citrate synthase activity**

Muscle homogenates used for Western blotting analysis were also used for determination of citrate synthase activity. After further 1: 10 dilution with 0.1 M Tris-HCl and 0.4% Triton X-100 buffer, citrate synthase activity was measured spectrophotometrically on the homogenates according to Srere

**Statistics**

ANOVA was used to compare the differences among all dependent variables to evaluate the acute effects of ginsenosides in the animal studies. Fisher's PLSD tests were used for the comparison of mean values between treatments. Pair t-test was used to compare mean difference between placebo and Rg1 trials. A level of significance was set at $P < 0.05$, and all values are expressed as means ± standard errors.

**Acknowledgements**

This work was supported in part by grants from National Science Council, Taiwan, Republic of China and NuLiv Science, Taiwan.
Conflict of interest

Authors declare that funders had no role in study design, data collection and analysis, in writing the manuscript, or decision to publish.

Author Contribution

References


Figure Legends

Figure 1. Rb1 and Rg1 exert opposing effects on glucose tolerance in rats. Glucose levels of oral glucose tolerance test after 1 night and 1 h of Rb1 (A) or Rg1 (B) intake. Chemical structures of Rb1 and Rg1 (C). Dosage: 0.1 mg/kg (1X), 1 mg/kg (10X), 10 mg/kg (100X), and 100 mg/kg (1000X) body weight. * significantly different from vehicle group, P< 0.05.

Figure 2. Rg1 improves insulin sensitivity of rats after a 10-week of administration. Glucose (A, B) and insulin (C, D) levels during oral glucose tolerance test for vehicle and Rg1 groups, respectively. Glucose levels during insulin tolerance test for vehicle (E) and Rg1 (F) groups, respectively. * significantly different from vehicle group, P< 0.05.

Figure 3. Rg1 improves meal tolerance and insulin sensitivity with accelerated glycogen accumulation in human skeletal muscle after 1 h exercise (70% VO_{2max}). Glucose (A) and insulin (B) levels after a post-exercise meal. Glycogen depletion rate during 1 h exercise (C) and glycogen accumulation rate (D) in human vastus lateralis during 3 h recovery. Rg1 was orally delivered 1 night and 1 h before exercise. * significantly different from placebo trial, P< 0.05.

Figure 4. Rg1 enhances citrate synthase (CS) activity of human skeletal muscle after exercise. * significantly different from placebo trial, P< 0.05.

Figure 5. Rg1 has no significant effect on blood myoglobin after exercise.

Figure 6. Rg1 prevents the increase of TBARS in human skeletal muscle after exercise. * significantly different from placebo trial, P< 0.05.

Figure 7. Rg1 reverses pro-inflammatory shift in balance of exercised human skeletal muscle. Real-time PCR data of mRNA for TNF-α (A), IL-10 (B), IL-6 (C), GLUT-4 (D), and PGC-1α (E). * significantly different from placebo trial, P< 0.05.
Figure 8. Rg1 prevents increased autophagy markers in exercised human skeletal muscle. Levels of p62 protein (A), LC3-I protein (B), LC3-II protein (C), ATG5 mRNA (D), and ATG7 mRNA (E). * significancely different from placebo trial, P< 0.05.
Table 1. Primer and probe sequences of target gene

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<tr>
<th>Gene</th>
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<td></td>
<td>Reverse Primer (5´-3´)</td>
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<tr>
<td></td>
<td>Probe</td>
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Table 2. Rg1 has no effect on isokinetic muscle strength.

A.

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B.

<table>
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<tr>
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Table 3. Rg1 improves high-intensity endurance performance.

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<th>P</th>
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<td>Cycling time to exhaustion (min)</td>
<td>31.8±5.0</td>
<td>38.3±6.7</td>
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<tr>
<td>Total work (kJ)</td>
<td>254±41</td>
<td>306±55</td>
<td><strong>0.04</strong></td>
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<tr>
<td>( \text{VO}_{2\text{max}} ) (ml/kg/min)</td>
<td><strong>41.6±2.4</strong></td>
<td>40.3±1.9</td>
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</table>
Figure 1

A.

B.
Figure 1.

C.

Ginsenoside Rb1

Ginsenoside Rg1
Figure 2

A.

B.
C.

![Graph showing Insulin levels over time for Vehicle condition](image)

D.

![Graph showing Insulin levels over time for Rg1 condition](image)
Figure 3

A.

B.
C.

Glycogen depletion rate (mmol/kg/h)

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D.

Glycogen accumulation rate (mmol/kg/h)

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<tr>
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</table>

* Indicates significant difference.
Figure 6

![Graph showing TBARS (μM) levels with Placebo and Rg1 treatments at different times (Pre, 0 h, 3 h).](image)

Placebo
- Rg1

Figure 7

A.

![Graph showing IL-10 mRNA (Fold) levels with Placebo and Rg1 treatments at different times (Pre, 0 h, 3 h).](image)

Placebo
- Rg1

-50%†
B.

C.

D.
Figure 8

Placebo Rgl

Pre 0 h 3 h 0 h 3 h

GLUT4 mRNA (Fold)

p62 (%)

Placebo Rgl
B.

C.