

NEW CONCEPT OF STRATEGY INSTRUCTIONAL DESIGN IN SPORT SCIENCE EDUCATION USING STATISTIC ANALYSIS TOGETHER WITH GAME SIMULATION

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ABSTRACT

The aim of knowledge management on sports education is different from other learning process. Because expect success in the sport game which wish win in the competition. This paper proposes new concept of generate instructional model in sport education which is powerful. We proposes robust sport constructivism model base on statistic in mistake of competitor. We started analysis of individual pattern in sport game with Bayesian Networks Theory. It will generate set of random variables and building mathematic model of Bayesian Networks. It used search for occasion get to point in tennis competition or other cord games. The replace style considered as weaknesses of player which can not be concealed while competition. It is instinct after hard training and generate to individual style. We predict with probability principle get to points and advantageous in tennis competition which are weaknesses and strength of each athletes. We use game simulation for building conception for win in real-life and self-Esteem with mode two players in Perfect Ace Pro Tournament Tennis of Playstation2 and Nintendo Wii. We convert statistic in mistake of athletes become to statistic model. Second, we convert result of probability in point become to strategy select the style of training for win in each match. We simulate training in console game for building clearly concepts. Finally, we use information for design detail of rehearses with weight value which use attack for weaknesses of rival. We design and develop sport constructivism by oneself recognition model for parameter of bay's network. This paper will return optimal education strategy for win in each competition. Our method reduces the fatigue caused by practicing beyond and reduces the opportunity of injury from training.

Keywords: Sport education, Instructional model, Cord games, Game base learning, Statistic.

INTRODUCTION

Due to nowadays sports game to part of human life rapidly in the pattern digital game, entertainment, sport for social communication and sport for health. Especially, sports as a career building high income for athletes and coaches. Beside, include income from award, sponsor and sport club. Most athletes can participate in the competition although has not graduated. The competition has several levels such as Junior, Pro levels and tournament. The teaching of sports is important instructional process equivalent to instructional process in

other careers. Sport education has features different from general learning. It has aims to develop athletes on a goal of winning in the sport competition. The achievement is difficult and uncertainty. It is limited in age range and health of players which is only teen. Due to it relate with several external factors such as competition, competitor and body-mind. The competitor is most important of oneself assessment. Only competitor is able to building win to us in game and only us is able to building win to competitors. The sports education divided to two mainly: first, sports education develops pro-athletes which expect success on competition. On the other hand, sports education in school which promotes the balance between the intellect and the body. This case without expect success on competition. This paper focus sport instructional process and practice management for develop professional athletes. We focus to advantage in the collect experiences from a competition. We development mathematic model, instruction model and process for analyze which potential get point of player and competitors. We infer in tennis game. It is representing of cord games.

LITERATURE REVIEW

From research in “Developing Competencies by Playing Digital Sports-Games” of Rolf Krentschmann from Department of Sport and Exercise Science, University of Stuttgart, Germany. This research public in February 2010, His idea for digital game-based learning (DGBL) is that students (or players) learn something by playing a computer or video game and that an educator can employ digital games to assist and boost both formal and informal learning. He refer game software that is not specifically produced for educational use but which is nonetheless regularly implemented in educational settings by educators. These so-called COTS (commercial off-the-shelf) games are particularly effective in socialization processes. COTS sports computer and video games can be divided into three main categories: sports simulation games, sports arcade games and sports management games. After taking a closer look at these sports computer and video games, specifically sports simulation games, it is possible to posit dimensions of competencies that are developed by playing those games. Various examples for each dimension of competencies can be generated: motor competence, cognitive competence, meta-cognitive competence, social competence, emotional competence, personal competence and media competence. Weaknesses of this paper are without method convert experience skill in videogame to real-life. It without the key of the application of knowledge is clearly of instructional model and accurate psychology. Gaming literature states several positive learning outcomes: the development of social skills (McFarlane, Sparrow hawk & Heald, 2002; Dondi, Edvinsson & Moretti, 2004), school achievement, cognitive abilities, and motivation towards learning (Rosas, et al., 2003), attention and concentration, complex thinking and strategic planning (Kirriemuir, 2005a; 2005b), information retrieval and multi-disciplinary skills (Mitchel & Savill-Smith, 2004), logical and critical thinking and problem solving skills (Inkpen, McGrenere, Booth & Klawe, 1997; Higgins, 2001; Rieber, 1996; Whitebread, 1997), collaboration with others (Williamson & Facer, 2003), meta-cognition skills and strategic decision-making skills (Bonk & Dennen, 2005), eye-hand coordination skills and rule learning (Dondi, et al., 2004), communication, team-building skills and strategic thinking (Dondi, et al., 2004), spatial skills (Calvert, 2005; Gunter, 2005), sound learning (Gee, 2003), gross motor and fine motor skills (Becker, 2007), meta- /memorial- skills (Gunter, 2005), and rules (Juul, 2005).

PROPOSED METHOD AND EXPERIMENTS

This paper focus sport instructional process and practice management for develop professional athletes. We development process for analyze the potential get score point of player and competitors. We use statistic value combine artificial intelligence consider from action pattern in past time search for mistake and weaknesses of competitor. It support design practice schedule. It helps decrease practice time while higher performance, flexible and robust compatible with needs to temperature skill in each match. In sports psychology, can create a concept and motivation of planning to be cautious. It helps eliminate fear in the famous competitor or defeated competitor in previous time. We use predominate for suppress fear in the subconscious. We are planning and simulation to action in game with console Game Play station type II Technology. We can see top view perspectives and weaknesses of competitors precisely. We recognize techniques to win from the game. We operate similar to self hypnosis. We use arcade games or simulation digital games with mode two players. Beside, we can know style of play is effect to injury of competitor. It helps simulation for action and position that competitors often miss point. This project is developed to predict the opportunity to win the competition of athletes. Data analyzed by the nature of play and rules of tennis. It generates a random variable. We use these variable generate to model the Bay theory which is similar to decision tree theory (Decision Tree). But a different theory of Bay Networks will return answer to be the probability. It is the process of implementation as follows; 1) Storage information of tennis competition. 2) we used generate fact to Bayesian Networks. 3) the design and analysis of the competition. We consider the nature of play relate with rules of tennis game (or other cord games). 4) Design techniques of playing to win using Play station type II. 5) Import to instruction model “Robust Sport Constructivism with Oneself Recognitions base on Game theory” for design appropriate training and schedule training. It helps to learn quickly for each competitor. The training strategy will be adjusted by the competitor.

First, the process analyses from tennis competition in the part time. We are clustering the data from tape competition. We reverse VDO competition and fill in the table analysis. We analyze from the first ball to last ball. We chose to analyze the competitive that target athlete is lost. We store the results in the database. The Table has two parts are input table and schedule probability.

Second, use rules of tennis game generate Bayesian Network.

Personal Action is a variable indicates about athlete of ball possession both are athletes (Player) or competitor (Competitor). **Position Ball** is coordinate that athletes hit the ball on the yard. **Action Hit** is the action of athletes which includes Backhand, Forehand, Shorthand, Spin hand **Serve Ball** is the point of athletes from serving or not. **Score Pointer** is information indicates the athletes for us to lose points or not. These variables are important factors which can affect the calculation and prediction of competition. It shows the opportunity of winning each point as a percentage follow probability. The relationship between these variables used to predict competencies of the rival, weakness and strengths of the rival. The action hit and serve action are effect to position of ball which touching the ground. In same direction, the position on the ground and player are directly affected to the score. The areas of action player must be the opposite position of ball on the ground. g as frequency of variables. We calculated probability with mathematic model as following.

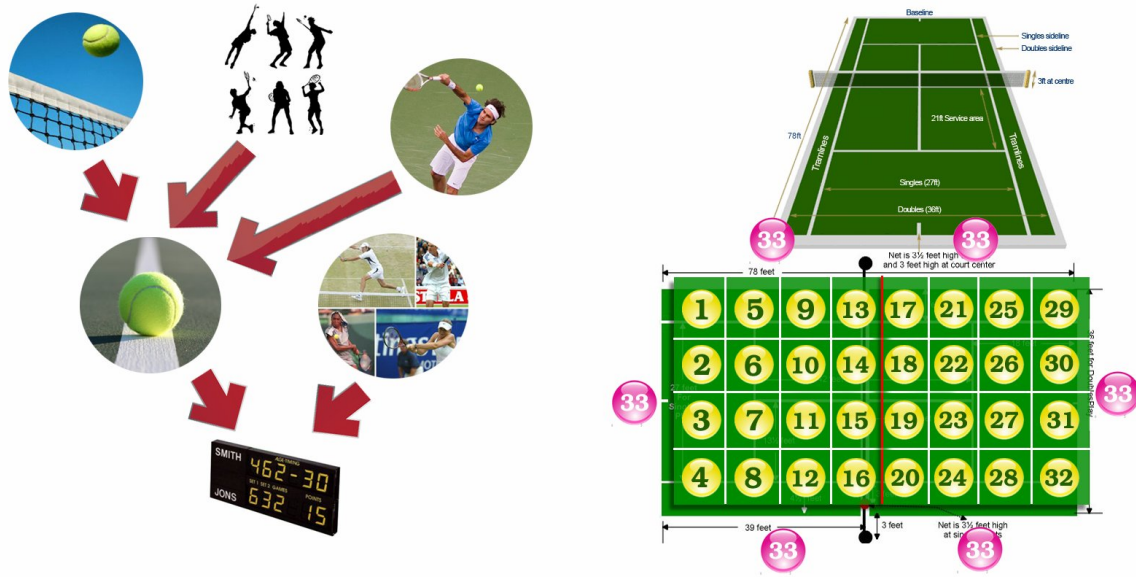


Figure 1

Show variable node in Bayesian Network

1) *Prior Probability Node*: Node of Action, Serve, and Personal Action can be calculated from the equation as follows;

$$P(A=a1) = \frac{g(A=a1)}{\sum g}$$

$$P(\text{Action} = \text{Forehand}) = \frac{g(\text{Forehand})}{\sum g}, P(\text{Action} = \text{Backhand}) = \frac{g(\text{Backhand})}{\sum g}$$

2) *Conditional Probability* : Node of Score and Position ball can be calculated from the equation as follows;

$$P(C = C1 | B = b1, A = a1) = \frac{g(A = a1, B = b1, C = c1)}{\sum ((A = a1), (B = b1))}$$

3) *Prediction Probability*: A Statistics model that is used to create strategies to win the competition. They will predict for opportunity to take point in each play of our athletes. It predicted the probability of several factors that we choose. It calculates the probability from total probability as follows; [1] P(Sc|A, Se, PB, PA) [2] P(Sc|A, Se, PB) [3] P(Sc|A, Se, PA) [4] P(Sc|A) [5] P(Sc|A, PA) [6] P(Sc|A, PB) [7] P(Sc|Se, PB, PA) [8] P(Sc|PB) [9] P(Sc|Se, PA) [10] P(Sc|Se) [11] P(Sc|A, PA) [12] P(Sc|Se, PB) [13] P(Sc|PA) [14] P(Sc|PB, PA). Due to Bay Theory interested only node dependencies or affect each other. The probability is point over the competition will be used only five equations at a time. This is example of search probability in P(Sc|PA, A)

$$P(\text{SC} | \text{PA}, \text{A}) = \frac{P(\text{Sc} | \text{PA}, \text{A})}{P(\text{PA} | \text{A})} = \frac{P(\text{Sc} | \text{PA}, \text{A})}{P(\text{PA})} = \frac{P(\text{Sc} | \text{PA}, \text{A})P(\text{PA} | \text{A})}{P(\text{PA})} = \frac{P(\text{Sc} | \text{PA})P(\text{PA})}{P(\text{PA})} = P(\text{Sc} | \text{PA})$$

From figure 1, Node is influence to Se node is PB node and PA node. Therefore, this equation return the answer equal to the No.14, The details are as follows; Equation P(Sc|A, Se, PB, PA) and P(Sc|Se, PB, PA) will match with probability of No.14. Equation P(Sc|Se, A, PB), P(Sc|A, PB) and P(Sc|Se, PB) will match with probability of No.8 and Equation P(Sc|Se, A,

PA), $P(\text{Sc}|A, PA)$ and $P(\text{Sc}|\text{Se}, PA)$ will match with probability of No.4, which present detail as (1) $P(\text{Sc} | A) = P(\text{PB} | A) P(\text{Sc} | \text{PB}, A) + P(\sim\text{PB} | A) P(\text{Sc} | \sim\text{PB}, A)$ by $P(\text{PB}|A)$. It calculate from equation $P(\text{PB} | \text{Se}, A) P(\text{Se} | A) + P(\text{PB} | \sim\text{Se}, A) P(\sim\text{Se} | A)$ (2) $P(\text{Sc}|\text{PB}, A)$ calculate from $P(\text{Sc}|\text{PB})$, because rule of Bayesian Network define Sc depend on PB. (3) $P(\sim\text{PB}|A)$ calculate from $1 - P(\text{PB} | A)$ follow rule of Bay [$P(A|B) + P(\sim A|B) = 1$] (4) $P(\text{Sc}|\sim\text{PB}, A)$ calculate from $P(\text{Sc}|\sim\text{PB})$ as $P(\text{Sc}|\text{PB}, A)$

Statistics used analysis competency of athletes; quantity of forehand-backhand by athletes, ball touching ground in each position by athletes, hit action which is effect to ball touching ground in each position by athletes, hit action which is effect to athletes receive points, quantity of losses point in each position, to get points in each position by athletes, quantity of losses point from serve ball, quantity of losses point from forehand ball-backhand ball by athletes, quantity of get points from forehand ball-backhand ball by athletes, quantity of forehand-backhand by the rival, quantity of ball touching in point area by the rival, quantity of serve ball to point by the rival, quantity of losses point from forehand-backhand ball by the rival, quantity of losses point in each position by the rival, position of losses point by the rival. We find the weaknesses strengths of both sides of AI statistics. We will find a format that rival does not dominant, injury, mistakes and lose points. We will find strengths of rival that we must protect the opportunity not to happen. Sample, how many probabilities for us players hit the backhand dropped to ninth position? We can find answer from this equation.

$$P(\text{PB} = 9 | A = \text{Backhand}, PA = \text{Player}) = \frac{\mathcal{G}[9](\text{backhand}, \text{Player})}{\sum \mathcal{G}[9]\text{backhand}, \text{Player}}$$

Examples of prediction: How many probability of get point If set a player to ninth position? $[(\text{Person Action} = \text{Player}) \& (\text{Position Ball} = 9)] = 5.123$ which calculate and compare Score Pointer node in the database.

Third, strategy planning to the simulation with Sony Play station or Wii

We develop an instruction model under the ADDIE pattern. It helps students develop to professional athletes.

Fourth, import to Robust Constructivism with Oneself Recognition Model (CORM)

PART OF SUPPORT: This is support learning by coach. They are responsible for operation in the form of CEO sport manager. They are scaffolding instructional in constructivism theory. This cycle include the operation and indicators as follow;

1.1 Coach Analysis: Coach analysis role, responsibility and ethics of coach. We called Pyramid Tennis. Philosophy of Coach is Athletes first-Winning second. Coach encourages athletes to grow as individual players, encourages to victory and encourages to fun in competition. The role in coach profession consist twelve roles as follows; 1) Instructor as a guide the activities 2) Teacher manage for learning environment. 3) Motivator in a positive thinking which encourages to high quality athletes. 4) Disciplinarian determines the appropriate for reward and punishment. 5) Manager is leadership and defines direction of training. 6) Administrator manages document management and organization. 7) Publicity Agent contact to communicate with the public media. 8) Social Worker is the counsel of athletes at all times. 9) Friend. 10) Sport Scientist makes analysis, evaluation and conclusion. 11) Student makes research by listening, speaking, reading and writing. 12) Sparring partner of athletes. There are three styles of coaching as follows; Authoritarian, Cooperative and Casual. The tennis coaches have to meet ever-changing in athletes such as age of athletes,

physically, emotionally, techniques, new technology in sports science. They have solved problems and develop new techniques all the time.



Figure 2

Show simulates with video game console game; Sony Play station or Nintendo Wii is connecting to instruction model “Robust Constructivism with Oneself Recognition Model” for convert game skill to real-life situation.

1.2 Test and analysis learning style; Coach will have to analyze the style of each athlete's training such as someone like to watch video competition, someone like to hard rehearse or someone to see a real competition. Coach is choosing the correct style will encourages athletes to learn quickly.

1.3 Design and develop learning process; Coach will provide technical learning relative with the style of each athlete. It can be adapted appropriate to style of each athlete. It applied to several types of sports.

1.4 Research and study sport science report; Coach will monitor information about sport research, conference, journal, field research, cheering team, psychology and sports clubs management, equipment and technology in score processing, technology in sport science, the research about danger-opportunities of injury from the rehearse etc.

1.5 Communication teacher and administration; Coach will choose channels in good communication with athlete such as online, mobile learning, game simulation, Specific words and definitions in sport game (Tennis), communicate with body language both are formal and informal, narrator in sport competition, the interview, the interview is affect to members of sport club, technique in select and negotiate with the sponsor. Include pattern of teaching and instructional model for each athlete.

Assessment processes in the part of support; Coach can solve problems relating to the administration's revenue of sport club, budget, and the success of the athletes. Coaches develop planning for appropriately individual athletes. Coach is a scaffolding instruction. It will disappear when athlete as the professional.

ROBUST SPORT CONSTRUCTIVISM WITH ONESELF RECOGNITION MODEL Copyright © 2012
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Figure 3

Show Robust Constructivism with Oneself Recognition Model

PART OF SURVEY: the athletes will explore the environment in own learning about strengths, weaknesses, limitations, advancement opportunities, style of learning and acceptance in result of the competition.

2.1 Survey Thinking; the athletes try to find own style such as long ball, shot ball, close to net ,high ball and spin from back cord. Accept in own style. Athletes define objective for competition in the short term and long-term. Athletes have a positive attitude in the competition. They know manage anger emotion and control fear of famous competitor. Athletes can get to know the limits of own bodies and the risk of injury to themselves.

2.2 SWOT and individual competitor; the athletes use statistical analysis based on a Bayesian Network. It was a mathematic model which used in forecasting, correlation of data, grouping and classification. They find strengths and weaknesses of own and competitors. They find feature for missed to score of competitors, strengths of competitors, features the advantages of competition. Athlete use probability analysis competencies of competitor precisely.

2.3 Strategy and planning with digital game; Sony Play station and Nintendo Wii the athletes plan strategy to win in competition using simulation on the console game. They play in two player mode without artificial intelligent. Another athlete controls play in the style of the competitor such as strengths, weaknesses etc. Athletes rehearse attack weaknesses of competitor. Adding protect opportunities to get points in the competitor. They are building conceptual in the competition from several perspective viewers. Athletes rehearse for recall or recognition when play tennis in the real world.

2.4 Training in real life; the athletes will design the schedule of rehearse appropriately. It helps to reduce unnecessary practice and protect the opportunity of injury from training.

2.5 Convert digital game conceptual to competition skill; The psychological process is creating imagery support robust emotional, protect of fear in the stadium, quick connecting

between prior knowledge with new experiences to create new knowledge and reduced pressure in real competition. Understanding of the failure in real competition is just a game which can be corrected by pressing button. It is a mechanism to create images in the subconscious. We convert imagine of the experience inside digital game to control situation in the real competition.

2.6 Experimental in real-competition; The athletes cumulative experiences a real competition and use it update skill to play digital games. However, the experience in the real-competition will added what is lacking in this game such as rate of fatigue, real speed of athlete, direction of athlete which is not limited amount causes the amount of keys. Finally, convert to topic 2.3 to improve Techniques playing in real competition. The players can create flexibility style in the individual competitor.

Assessment processes in the part of survey; The athlete evaluates environment in learning base on game theory. The athlete evaluates evaluate the own progress and assessment of the continuously competition. We combine Bayesian Network, simulation on console game and a real competition improve internal processes.

PART OF SELF and AQ (Adversity Quotient): this section support the athlete to recognize own values and “Adversity Intelligence”. Basically, the concept has to do with how we respond to life’s events, or our capacity to respond productively in times of stress. AQ or Adversity Quotient is the science of human resilience. People who successfully apply AQ perform optimally in the face of adversity. A high-AQ workforce translates to increased capacity, productivity, and innovation, as well as lower attrition and higher retention. AQ has helped many organizations improve competencies, develop resilient leaders, create high-performing teams, and high-performing people.

3.1 Feature of athlete professional; The athlete collects the features of professional sports such as do not use narcotic, discipline recognition, punctual, goal in practice, good health, blank meditation etc.

3.2 Motivation and progress; Our activities reinforced using dialog process in HR field about own progress and sharing experience competition within the team, pride in own lives and families, reward and certificates, as well as valuable experience in life athletes.

3.3 Create a difference; Our activities reinforce creativity in competitive strategy. The athlete use self-confidence rather than concepts framework of others. Dialog activity helps athlete to different thinking and finds new technique which is better.

3.4 Sport tournament skill; The athlete learns how to choose the appropriate competing by them, design scheduling of the tournament by themselves, self-assessment in each match. The participation in competition is influences to change the order of performance. The athletes can appropriate planning for age and health of themselves. The athletes have knowledge about the competitive event.

3.5 Idol club and trend leader; The athlete learns how to create a popular for members of sport club or media channel. An athlete learns about psychological of spiritual leader, leadership popularity, cheering management or crowd management, communication techniques with sponsor as important part of the team. The athlete learn how to the interest and lovely for the public.

Assessment processes in the part of self and AQ (Adversity Quotient); the athlete learns assessment activity which supports success of them. It is part of Accelerator Learning principle which can help to learn faster than normal 65-80 percentage in each athlete. The athlete learns use experience in sports generate to develop themselves without the limitation.

PART OF SUCCEED: This section indicators success in the development of professional athletes. The athletes learns base on competition using a powerful robust constructivism.

4.1 Oneself Recognition; The athletes know identity of oneself enough to be self-directed learning. The athletes have knowledge about limit of them, the rehearse capabilities of them. They have own goals in the competition. The athlete recognize in the learning styles of themselves. The athletes can develop model of appropriate rehearsal with themselves.

4.2 Sport Science and technology; The athlete learns about sport scientific principles, technology to measure and score display in the sport competition, theory of anatomy and human physiology, self-directed learning, performance evaluation in sport, a study about use stimulant and addictive substance medical in the sports, anesthesia technique, physical movement, simulation, analysis of the competition from multimedia, statistics in prediction result of sports, psychoanalysis theory in the sports education, computer skills, internet skill and sports application.

4.3 Sprit Attitude; The athlete learns to accept the decision of the competition board. The athlete learns the role of competitor. The athlete is responsible for member sport club and cheering team.

4.4 Long life and e-Portfolio; The athlete are the durability knowledge. The athlete accumulates knowledge from the experience of competition and appears in the e-Portfolio. The athlete is preparing competition more difficult. The athlete is preparing in competition more difficult.

4.4.1 e-Portfolio; The athlete is recording the story of the competition in the each time as follows; the results of the competition, the satisfaction in the competition, goal in the competition next time, rehearsal schedule, observations from practice, problems in the cord, new knowledge from the competition, VDO file and photo from the competition, style playing of competitor.

Indications of result of instruction model by “Robust Constructivism with Oneself Recognition Model”.

1) Result of the Intelligent Learning; The athletes have the ability to self-development with self-directed learning (SDL). They can take care of themselves when scaffolding instruction disappeared that means coach.

2) Process by oneself; The athletes have clear guidance to developing self. The athletes can evaluate sport competency of oneself and competitor. The athletes can be thinking systemic and intelligent in solve a problem especially for planning about time.

3) Use full power of technology; The athletes can use sports science principles and skills in information technology as well. The athletes can be made innovation in sport. The athletes can find a new playing technique from the Internet Network.

4) People of state as an athlete; The athletes are proud to opportunity in build a reputation for own country. They have valuable for cheering and leading to social change to the better.

RESULT

The experimental group of this research is 42 students in 4th semester of Faculty of Science by majoring in Sports Science, CRU. We found the students were satisfied with the *Robust Constructivism with Oneself Recognition Model*. We divided the students into two groups to measure achievement learning. This research combine between qualitative research and experimental research by pattern one group pre-test and post-test design. First is control group, 21 students learning from classroom together with playing tennis normally(50-50 percentage). Second is experimental group, 21 student learning by *Robust Constructivism with Oneself Recognition Model*. These students register in the course of tennis II subject. We take the time to experiment 1 semester. We measure the ability to solve problems in playing by test and assessment from actual playing. Two groups test by playing tennis 2 times as beginning and end of term. We compare rate of self-development of the athletes. Result of

the experiment, the scores both in theory and playing of the experimental group more than the control group clearly. 41.53% of control group find that skilled in playing computer games more. 71.43% of control group find that computer game helps to control the match of tennis competition. 87.71% of control group find that analyzed Bayesian Network and predicted by accuracy. 63.31% of control group find that reduce the fear feeling for competitor which is playing better than them, 91.49% of control group find that *Robust Constructivism with Oneself Recognition Model*.

DISCUSSION

From experimental result that Bayesian Network can predict competencies of competitor accurately. It helps the design schedule and activities for rehearse. The computers games help reinforce skills in sports such as motor competence, cognitive competence, meta-cognitive competence, social competence, emotional competence, personal competence and media competence. *Robust Constructivism with Oneself Recognition Model* develop base on game base learning, statistic analysis. It helps reinforce positive learning such as school achievement, cognitive abilities, motivation towards learning, attention and concentration, complex thinking, strategic planning, strategic decision-making skills, rule learning, communication, team-building skills strategic thinking, spatial skills, information retrieval, multi-disciplinary skills, logical and critical thinking, problem solving skills, collaboration with others, meta-cognition skills, eye-hand coordination skills, sound learning, memorial-skills. We focus to be on transferring digital game experience into real life competition. In the next experiment, the researchers should improve this model to adapt to other sports such as racing, karate-do, taekwondo, Thai boxing and football.

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