The Application of Psychology in Educational Games Based on Multiple Intelligences Related to Its Role in School Maturity

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Abstract

The purpose of this study was to determine the application of psychology in educational games based on multiple intelligences related to its role in school maturity. The research hypothesis is that "There is a difference between groups of school maturity who got educative game based on multiple intelligences with a group that did not educative game based on multiple intelligences. The group that was given educative game based on multiple intelligences increased school maturity higher than the control group". The population in this study were 293 students. Based on purposive sampling method, there were 30 students as samples in the research. Measurements were performed using Nijmeegse Schoolbekwaamheids Test (NST). By using the technique of paired samples t test analysis through SPSS, the results obtained in the experimental group, t count <t table (-16.313 <-1.761) and the results of significance of 0.000. It showed difference in school maturity among students. Means with the educative game based on multiple intelligences increased the school maturity. And this was proved with greater mean on experimental group, which is 132.6667. While the control group mean only 90.5333. It shows that the results of the experimental group are better than the control group.

Keywords: Educative Game; School Maturity; Multiple Intelligence

Introduction

School maturity or school readiness involves more than just children. School maturity, in a broad sense, is about children, families, the school environment and the community. Their skills and development are greatly influenced by their families and through their interactions with other people and the environment (Maxwell & Clifford, 2004).

In America, an education strategy puts maturity at the top of the agenda, including a plan to measure the nation's success in achieving the goal that all children in America are ready for school. Families, community partners and educators contribute to school maturity (Gilbert, et. al, 2011). In Indonesia, Early Childhood Education (Pendidikan Anak Usia Dini/PAUD) is a coaching effort aimed at children from birth to 6 years of age which is carried out through providing educational stimuli to assist

The Application of Psychology in Educational Games Based on Multiple Intelligences Related to Its Role in School Maturity

729

growth and spiritual physical development so that children have readiness to next education (Depdiknas, 2007). From this education, the potential of children can be promoted.

Based on the description above, it can be seen that school maturity plays an important role in the school's academic process and must be supported by physical health, the school education system and the family. In school and home education, an interesting and useful treatment is needed in preparing for school maturity. This treatment must also be adapted to the child's psychological and physical development so that it runs according to child.

Related to school maturity, there are several aspects in the recapitulation of teacher assessments per month that support the assessment of school maturity as stated by Monks, et al. (2006) that in addition to the results of the *Nijmeegse Schoolbekwaamheids Test (NST)*, it is also necessary to assess aspects of behavior, namely social adjustment, work ability and independent attitudes that are assessed by teachers or parents. At preliminary study, we found that the student's social adaptation was 40% developing as expected, 47% starting to develop and 13% not developing. As for the independence of students, 40% developed according to expectations, 33% began to develop and 27% did not develop. Meanwhile, 7% of the student's task abilities developed as expected, 33% began to develop and 60% had not. Based on the data, it can be seen some aspects of maturity need to be. Only a few developed as expected, but none did very well. This proves that school needs some treatments for increasing school maturity, one of them is educative game treatment.

Educative games are a treatment that is applied to overcome the school maturity of preschool children. This game is suitable to be applied because it is in accordance with the psychological development stage of children who still enjoy playing. It is through games that the teaching elements can be included. Even this game can also be applied at home and at school, so that the handling can be comprehensive if teachers at home and school understand and use this game.

Playing has its own influence on physical development, encouragement to communicate, distributing hidden emotional energy, needs and desires, learning resources outside the home or school, stimulation of creativity, development of self-insight, social learning, moral standards, learning to play according to gender and the last is the development of personality traits (Hurlock, 2012). If playing is done in accordance with the development stage, with good intentions and the right amount of time, then the influence on several of the above aspects will be positive. Conversely, if playing a game doesn't match the criteria it should be, the effect will be negative. For example, when children play games online too often, they are less able to socialize well, thus hindering the psychological development they should go through.

Based on the description above, it can be justified the statement that children really like to play and games are one of the most efficient ways for them to learn. Even in the world of psychology, games are often effective in psychoeducation groups (Waac, 2006: 156), namely groups that are associated with explaining information about certain topics where the facilitator prevents psychological disorders by increasing self-awareness, knowledge and skills about specific developmental issues that are relevant.

Each person has several ways in which he or she learns best. The learning theory that has brought light to the way in which each child learns differently is multiple intelligence (MI) theory (Adcock, 2014). Howard Gardner proposed that there is no single, unified intelligence but rather a set of relatively distinct, independent and modular multiple intelligences (Chongde &Tsingan, 2016). The emphasis is on learning rather than on outcomes, as the evaluation process gathers information about individual's capabilities to provide useful and relevant information for learning. In this sense, Gardner considers the assessment of intelligence as a procedure which should be understood as a part of the teaching and learning process.

Cognitive competency is assessed in a natural way at the appropriate moment. Thus, abilities are assessed in the classroom as students learn the curriculum (Almeida, et.al, 2010).

Referring to the description above, it is necessary to improve school maturity by educational games based on multiple intelligences in order to better adapt to the various children's intelligences and the results that will be obtained are also more spread out to many children's abilities.

School Maturity

Britto, et al. (2012) argue that school maturity focuses on children's learning and development. It refers to what children should know and be able to do in order to enter school ready and eager to learn, thereby enabling a successful transition to a primary school learning environment. Success in school is determined by a range of behaviours and abilities. Meanwhile, according to Rafoth, et al. (2004), school readiness is the achievement of a child from a certain set consisting of the emotional, behavioral, and cognitive skills needed to learn, work, and function successfully in school. Mashburn and Pianta (2016) said that school maturity as school readiness is the development of social and academic competencies that children are presumed to need to start school ready to learn, such as academic and cognitive skills, language and literacy abilities, and social emotional functioning.

So, school maturity is a successful development that allows children to be involved and can benefit from the learning experience in kindergarten, so that they can continue to the level of elementary school education.

Educative Games

Educative game is the act of teaching and learning in formal and/or non formal education, by using games that are explicitly designed to fulfill learning objectives and have fun when used to pursue learning goals (Kirriemuir & McFarlane, 2004). Fadlillah (2016) argued that educational games are a form of tool or means of playing contains educational values in it. Play is a series of activities or children's activities for fun. Whatever the activity, as long as it exists element of pleasure or happiness for early childhood it can be referred to as played.

So, it can be concluded that educational games are recreational activities that can influence human psychological development through educational or teaching programs.

Multiple Intelligence

Multiple intelligence theory represents the pluralist appearance of intelligence domains and the diversity of the ways of expressing the skillfulness and skills of the individual in the scope of their own culture. Intelligence domains of an individual should be profiled taking into consideration the culturally-valued behaviors within a specific environment, rather than applying a single test to detect the intelligence of the individual (Temur, 2007).

The various intelligence areas are: (1) Verbal/linguistic intelligence: the production of language, abstract reasoning, symbolic thinking, conceptual patterning, reading, and writing. (2) Logical/mathematical intelligence: the capacity to recognize patterns, work with abstract symbols and discern relationships or see connections between separate and distinct pieces of information. (3) Visual/spatial intelligence: visual arts, navigation, mapmaking, architecture, and games requiring the

The Application of Psychology in Educational Games Based on Multiple Intelligences Related to Its Role in School Maturity

731

ability to visualize objects from different perspectives and angles. (4) Bodily/kinesthetic intelligence: the ability to use the body to express emotion, to play a game and to create a new product. (5) Musical/rhythmic intelligence: capacities such as the recognition and use of rhythmic and tonal patterns and sensitivity to sounds from the environment, the human voice and musical instruments. (6) Interpersonal intelligence: the ability to work cooperatively with others in a small group, as well as the ability to communicate verbally and nonverbally with other people. (7) Intrapersonal intelligence: the internal aspects of the self, such as knowledge of feelings, range of emotional responses, thinking processes, self-reflection and a sense of intuition about spiritual realities. (8) Naturalistic intelligence: the ability to recognize patterns in nature and classify objects, the mastery of taxonomy, sensitivity to other features of the natural world and an understanding of different species (Stanford, 2003; Yalmaci &Gozum, 2013).

Samples and Data Collection Techniques

The subjects in this study were 30 students. The criterias of samples are:

1. Students in group B kindergarten who were not ready for school based on the NST pretest.
2. Minimum age of 6 years when entering elementary school in the new school year. This is adjusted to the regulations of the National Education Office in Indonesia.

The treatment by educative games was given to the experimental group, 15 kindergarten students who were not ready for school based on the results of the NST psychological test. The treatment was given 4 times a week with a duration of 1 hour. The treatment was divided into 2 groups according to the class so that the intervention was maximized with a smaller number of students and did not interfere with the schedule of teaching and learning activities that students had to attend at school. The games given are adjusted to the target aspects of maturity and the question model in the NST test.

Instrument Test

This research used Nijmeegse Schoolbekwaamheids Test (N.S.T.) compiled by Prof. F.J. Mönks, Drs. H. Rost and Drs. N.H. Coffie, was a measuring tool to determine the maturity of the aspects that support children's readiness to study at elementary school. The aspects of scale are observation and the ability to distinguish shapes; soft motoric skill; Understanding about size, quantity and comparison; keen observation; critical observation; concentration; memory accuracy; understanding of the object and valuation of the situation; understanding simple descriptions; self-concept. All the items are valid with r values 0.379-0,749 and reliable with 0,821.

Result

The kinds of educative game treatment and the result based on observation given are as follows:

GAME	ASPECT	BASED INTELLIGENCE	BEFORE TREATMENT	AFTER TREATMENT
Logico: The children are asked questions about mathematics and questions about the assessment of an object. The children must	Observation and the ability to distinguish shapes; Understanding about of size,	Logical/mathematical intelligence; visual/spatial intelligence; bodily/kinesthetic intelligence; verbal	Some students miscalculated and judged the comparison more and most	Students can count fluently and are better acquainted with comparative assessment

GAME	ASPECT	BASED INTELLIGENCE	BEFORE TREATMENT	AFTER TREATMENT
answer it by moving the answer button to the available questions	quantity and comparison	linguistic intelligence		
PAS string: Children are asked questions about finding differences and questions about the valuation of an object. The child must answer by moving the answer string to the available questions	Observation and the ability to distinguish shapes; understanding of the object and valuation of the situation	Visual/spatial intelligence; bodily/kinesthetic intelligence; verbal linguistic intelligence	Students are less able to distinguish forms with slight differences	Students are more capable in distinguishing shapes that differ slightly
Slide marbles and anchor beads: On the slide, the children must focus on inserting the marble into the hole through the slide and directing it to the lowest level. As for the bead anchor, the children are assigned to move the bead from one side to the other because there are many challenges that can break the concentration	Concentration	Visual/spatial intelligence; Bodily/kinesthetic intelligence	Students lack focus, quickly turn their attention to other things when doing assignments	Students can focus more attention when doing assignments
Magnetic pencil: The children are assigned to move the magnetic ball with an iron pencil to the specified place	Soft motoric skill	Visual/spatial intelligence; Bodily/kinesthetic intelligence	Students have difficulty drawing curves	Students find it easier to draw curves
Projector: The children draw animal and fruit pictures that are showed from the projector	Soft motoric skill	Visual/spatial intelligence; bodily/kinesthetic intelligence; naturalistic intelligence; verbal linguistic intelligence	Students mistakenly draw an example of a picture	Students find it easier to draw, and can even determine the right color for the image
Scoreboard: Children make block fractions of numbers into the numbers mentioned. Then, they are given a calculation problem and the children answer it by forming the answer numbers from blocks of numbers	Understanding about size, quantity and comparison	Logical/mathematical intelligence; visual/spatial intelligence; bodily/kinesthetic intelligence	Students often make additions and subtractions mistakes, and some write numbers wrong	Students have more control over adding and subtracting, and have correctly written numbers (1-20)
Text printing: The children move the pencil to follow the available line holes	Soft motoric skill	Visual/spatial intelligence; bodily/kinesthetic	Students often cannot draw	Students know their mistakes when they do not make straight

GAME	ASPECT	BASED INTELLIGENCE	BEFORE TREATMENT	AFTER TREATMENT
		intelligence	straight lines	lines because of mistakes made from a print. So that they are more accustomed to making straight lines
Glass rotation: The children guess where the ball is hidden under the glass that has been rotated	Memory accuracy	Logical/mathematical intelligence; Visual/spatial intelligence; Bodily/kinesthetic intelligence	Students often misrepresent information that has previously been obtained	Student's error in providing information that had previously been obtained was reduced
Guess the plants: The child's eyes are covered with a cloth and the child must look for the plant mentioned by groping and finding the plant in question among other plants in the box	Memory accuracy; keen observation; critical observation; understanding of the object and valuation of the situation	Visual/spatial intelligence; bodily/kinesthetic intelligence; naturalistic intelligence; verbal linguistic intelligence	The students are less sensitive to the experience of touch and the ability to distinguish from it	Students are more sensitive to touch experience and the ability to distinguish between them, and are more familiar with and memorize plants
Group games: walking together and complete body parts competition. Students are assigned to arrive at their destination with their feet tied together and must stop when the music is turn off. In another session, the student had to attach their body parts together by working together in a team. And some arrange the body part puzzle together.	Self concept	Visual/spatial intelligence; bodily/kinesthetic intelligence; Interpersonal intelligence; Intrapersonal intelligence; musical intelligence; verbal linguistic intelligence	Some students are still accompanied by their parents in class, do not socialize well and draw incomplete people.	No parents wait in class for students, socialization with friends is improving and drawing people more completely than before, students begin to get used to the music at work
Guess the story: After the children hear the story, the children answer questions related to the story	Understanding simple descriptions	Verbal linguistic intelligence; visual/spatial intelligence	Many students do not understand the story, answer the questions related to the story incorrectly, are unable to separate the story so that it merges with other stories	Students begin to understand the story and are better able to separate the story so that it is not immersed in other stories
Guess the picture: The children guess the	Memory	Verbal linguistic	Students are not	Students are more

GAME	ASPECT	BASED INTELLIGENCE	BEFORE TREATMENT	AFTER TREATMENT
incomplete picture and the location of the picture in question	accuracy; keen observation; critical observation; understanding of the object and valuation of the situation; observation and the ability to distinguish shapes	intelligence; visual/spatial intelligence	thorough in doing assignments, some answers to questions are missed even though they know the answers	thorough in doing assignments and answer more questions correctly
Games with time and music: The student do the previous games, but is given time and the music is turning on during the games. After 1 minute, the child must move on to another game	Speed of doing tasks related to ability in the aspect of maturity	Visual/spatial intelligence; bodily/kinesthetic intelligence; naturalistic intelligence; verbal linguistic intelligence; musical intelligence; intrapersonal intelligence; naturalistic intelligence	In doing assignments, students need a long time, especially when facing difficult questions	Students start to be able to manage their time better, so that they can complete assignments faster

From the t test results, it is known that in the experimental group, -t count <-t table (-16,313 <-1,761) and the significance result is 0,000. Thus, the alternative hypothesis is accepted. There was a difference between the results before and after the intervention. This shows that the intervention is effective in dealing with school maturity. While in the control group, it was found that -t count <-t table (-3,722 <-1,761) and the significance result was 0.002. Thus, the alternative hypothesis is accepted. There is a difference between the pretest and posttest results.

The mean of the experimental group was greater, namely 132.6667. Meanwhile, the mean of the control group was only 90.5333. This shows that the results of the experimental group are better than the control group with the treatment carried out to the experimental group. As for the results of the categorization of school maturity, there was a better increase in the experimental group.

Discussion

Based on data analysis, it is known that educative games based can improve student's school maturity. This is evidenced by the results that 100% of the experimental group students were declared ready for school. Meanwhile, in the control group who were not given treatment, only 46.7% were ready to go to school.

Increasing school maturity can be further clarified by an increase in maturity per aspect in the NST psychological test. All improvements were in the aspects of the NST psychological test, but the most seen was in the soft motoric skill aspect.

Meanwhile, when viewed from the effectiveness of this type of play, the games that most improve children's abilities are the PAS string game, marble slide, bead anchor, magnetic pencil and group games. But overall, games improve children's abilities related to aspects of the NST test.

This proves that educative game based on multiple intelligence has benefits for children's development. As stated by Goldstein (2012: 6) that with this game, it will provide benefits to emotional behavioral, social and physical development. These benefits will support children's school maturity.

Because school maturity is an important asset for children to be comfortable in studying at elementary school, a selection should be made using a psychological test as a parameter.

Research Limitations

There were students who did not attend school, so that they did not get the complete treatment.

Suggestion

1. Theoretical Suggestions

  a. Similar research can also be carried out for different subjects, but it is better if further research will expand the criteria for the subject and increase the number of samples, in order to further explore children's school maturity.
  b. The standard of characteristics and types of educative games should be clarified more so that the games used actually get the education goals themselves.
  c. Children's school maturity is an important asset for children to attend further education in elementary schools comfortably. So, there needs to be a comprehensive socialization to the community about it.

2. Practical Suggestions

  a. Schools increase their educative games so that children are more enthusiastic about learning.
  b. Learning methods accompanied by educative games as a medium of learning should be encouraged so that children's school maturity can be accelerated and improved.
  c. School maturity should be made an absolute requirement for admission of new students in elementary schools, so that schools should actually make the right selection.

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The Application of Psychology in Educational Games Based on Multiple Intelligences Related to Its Role in School Maturity

736

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