

Snake and Ladder Games in Cognition Development on Students with Learning Difficulties

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Abstract

The usage of various suitable learning mediums in teaching and learning Mathematics enhances cognitive development of the students with learning difficulties. The aim of this study is to examine the using of snake and ladder game as a learning medium for those students with this learning difficulties. This study is using qualitative methods. Data was collected by observation of the game that has been conducted. The respondents for this study involve five students in the school A which have learning problems. Observation and outcome of data have been analyzed in order to make the researcher more convenient in gaining the information. The finding of this study showed that the usage of snake and ladder game enhances the cognitive development of the student with learning difficulties in learning Mathematics.

Keyword: Sanke and Ladder Games, Learning mediums in teaching and learning Mathematics, Cognition Development, Students with Learning Difficulties

Introduction

Education for all emphasize on the rights of every child to be educated regardless of their social background or intellectual development of the child. The need to provide education for every child has become one of the important social responsibilities in the community. Students with special needs who are in Special Education Programs Integrated Learning Problems in Malaysia consists of various categories such as down syndrome, Late Development (Slow Learner), Austisme, Hyperactivity and others (Ministry of Education, 2004).

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According to Noraini Idris (2005), Mathematics is a very important subject and is very challenging for most of the students. Mathematics also plays an important role in our daily life. Mastering in Mathematical concepts and skills are related to each other. Effective learning of Mathematics involves further understanding of the learning process, the characteristics of students who are at different stages of development and the factors that influence student motivation. Effective teaching and learning strategies are needed to ensure a successful learning process.

Teaching and learning program is designed to meet the needs of special needs students under the Special Education Programs Integrated Learning Problems which are flexible in accordance with the Education (Special Education) Regulations 1997. In this regulation states that "... teachers may make modification to the teaching and learning methods or techniques, the time allocated for each activity, the activities arrangement and also the teaching aids to achieve the aims and objectives of the Special Education ..." (Ministry of Education, 2004).

Implementation of teaching and learning in special education requires teachers to use a variety of appropriate strategies for self-development, skills, abilities, talents, interests and backgrounds of students. Before planning for the teaching method, teachers should take into account the weaknesses and strengths of students. This is because every student has their own capabilities and to ensure students' participation. At the same time, it aids the teaching and learning process to be more effective, meaningful and enjoyable.

Advances in technology provide facilities for teachers in the process of teaching and learning for students with learning difficulties. Teachers can use a variety of media to suit the learning and development of students' problems such as in the form of printing, audio, visual or computer-aided. However, game-based learning is able to attract students with learning difficulties as it gives a fun learning environment.

Thus, researchers suggested that snake and ladder game should be used as a medium of learning Mathematics for those students with learning difficulties in enhancing their development of cognition. Through this game, teachers are able to make the teaching and learning process to be more effective and meaningful and also to ensure the full participation of students in learning activities.

Literature Review

Cognitive Development

Cognitive Development studies on how mental skills are developed and changed based on physiological maturity and experience in which a student had gone through since childhood. Meanwhile, cognitive psychologists study on the differences and similarities in the processes that occurs in the mind for different ages. According to Suppiah et al. (2008), changes in cognition is associated with quality changes in thinking, for instance on how one's knowledge and ability have been upgraded. Cognition psychologists believe that any changes that occur in students is due to the interaction of students with their growing environment and also learning environment that they had gone through in school. Besides that, it is related to the background of family, friends and neighborhood as well. All life experiences will deeply influence the changes in students' cognition.

According to Adenan Ayob et al. (2011), the theory of cognition or information processing theories of memory has been classified into three main sections, namely:

- Long term memory
- Short term memory
- Sensory memory

Marilyn (2011) stated, students with learning difficulties is having problems in their long-term memory and short term memory. They are unable to remember what they had learned either in long-term memory or short term memory and also to ensure those concepts that they had learned to be processed and saved in their brain, too.

Based on the principles of cognitive theory, learning would take into account the ability of a student to receive the information provided. This means that the quantity of information to be presented at a time must be controlled so that it does not exceed the capacity of short-term memory for a student with learning difficulties.

Therefore, reading about cognitive learning theory provides a suitable material for researchers to conduct a research fulfilling the objective of the research. The use of snake and ladder game in class is to ensure that the students with learning disabilities are able to understand the concept of Mathematics.

Snake and Ladder Game

According to Mohd Hafis Muaddab (2012), snake and ladder game was created in the 2nd century BC by the name of "Paramapada Sopanam" (*Ladder to Salvation*). The game has been developed by the Hindus to teach their children as a lesson of morality whereby the snakes are bad omens and the staircase represents good values. Then the game has become part of the traditional game in Indonesia although there is no detailed information about its emergence in Indonesia. This game can also be used as a tool to educate, entertain and to build up interactive communication among the players.

A game board for snake and ladder game is with squares measuring 10 x 10. Squares on the board are counted starting with the number 1, which is from the bottom left corner up to number 10 in the lower right corner, from right to left starting number 11 on the second line until number 20 and so on until the number 100 in the upper left corner. The parcels have pictures with a message and deed. Order or good deed will usually via a ladder to reach the higher box while bad deeds will recoil into the lower compartment through the snake. According to Arinil Janah (2009), the report states that there is no standard game board for snake and ladder game. Everyone can create their own game boards with the total number of compartments, different number of snakes and ladders respectively that suit the players.

According to Rahman Faizal (2010), there are some rules in snake and ladder game:

- Every player must begin the game at the compartment number 1 and ended in the compartment number 100.
- There are certain amount of snakes and ladders located on particular parcels on the board.
- Each player will be represented by a piece of dice and a few objects.
- Snakes and ladders of various sizes are being used whereby the snake will cause the players to take a few steps of backward compartment and the advanced players will make some forward compartment.

- Each player must throw the dice in order to determine the highest value during the first round of the game.
- The player gets a turn to throw the dice again when getting number six and move forward to the appropriate compartments according to the figures shown.
- There can be more than one object that represents the players in a parcel.
- If the player is in the box with the snake, the player must go down to the box indicated by the head of the serpent.
- If the player is in the box with the ladder, the player must move to the boxes indicated by the peak of the ladder.
- The player who made it to the box of 100 will be the winner of this game.

Concepts and principles that have been introduced in snake and ladder game could help those with learning difficulties to enhance their cognitive development. Through the research that have been conducted, it is highly recommended that snake and ladder game is to be exposed among students even though most of the teachers may not agree as this method will take a long teaching and learning session which is the major limiting factors of this activity. The relevance of this study is to use a variety of media-learning of Mathematics for students to overcome their learning difficulties. As a result from the research conducted, hopefully the use of snake and ladder game will enhance the cognitive development and to overcome the learning difficulties in mastering the concepts and skills in Mathematics.

Mathematics as a Subject

Mathematics is a branch of knowledge that arises from the reasoning of the environment and celestial events. According to Mok Soon Sang (1995), the main elements in Mathematics including symbols such as numbers, points of line, form, language of mathematics, the principles, laws, theorems, and mathematical rules.

Mastering in Mathematical concepts and skills are interrelated. In order to solve a Mathematics question and also to apply on Mathematical skills which is too abstract, students need reasoning and to think out of the box (Sabri et al., 2006). Learning the concepts and skills in Mathematics is an active process. Mathematics is not only about counting, memorizing the formulas or theories, but it also involves research, testing and problem solving.

Teaching Mathematics should start with concrete experience for students to solve a problem. The next is to teach Mathematics in the semi-concrete ways in which the process in solving Mathematics can be done visually, and finally the abstract Mathematics question is given by using symbols (Sharif Ali Sharif Othman, 1988). All these measures are to facilitate students in developing an understanding of mathematical concepts and skills of Mathematics is considered as a difficult subject.

According to Sharif Ali Sharif Othman (1988), Mathematics is an abstract and boring subject. To overcome this problem, teachers should use a variety of media-learning and doing some activities to meet their requirements, giving benefits and bringing fun for them. To play games is one of the suggested activities that can meet the learning needs of the students because it is fun and interesting. Some of the purposes to conduct games in the classroom are:

- To give the students some experiences. Students are exposed to a variety of games.
- To add on the students' vocabulary in Mathematics, for instance: "many", "few", "more", "same", "long", and so on.
- To reduce the stress of students because it does not emphasize on the use of numbering and counting.
- To create awareness and to attract their attention on the subject.

According to Noraini Idris (2005), students have to develop the concept and mathematics skills through their knowledge and experiences while learning Mathematics. Teachers' pay less attention on group activities, communication in mathematics, and games in Mathematics because they are lack of the time to fulfill the Mathematics curriculum. However, these activities actually bring benefits to the students to improve their understanding of Mathematics and also to improve their cognitive development as well as involving other skills such as socializing, interaction and communication.

Students with learning difficulties are unable to process the information given especially in language-based activities and cause disruption in the learning activities. These students have the average or above-average intelligence but with significant problems in learning experiences such as reading, writing and calculating (Marilyn, 2011).

Persons With Disabilities Act 2002 (Malaysia, 2002) defined that “persons with disabilities” include those who have long term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society. It depends on age, gender, social and cultural factors.

Cognitive changes for students with learning disabilities are not in line with the changes in their physiology. At the age of adolescence, the development of students' cognition should rise up and they have begun to think abstractly, so called formal operational thinking. According to Piaget (1969), a student should be able to do the following things:

- Solving concrete and abstract problems.
- Examine their own feelings and thoughts.
- Applying some principals in problem solving.
- Forming hypothesis when solving problems.
- Increasing the schemata for mental structure.

However, students with learning disabilities have a weakness in the aspect of cognition including attention, perception, memory and thinking or processing information.

According to Zera and Lucian (2001), these types of students have a weak selective attention. This is because they are hard to have a significant boost to their environment. They are unable to identify the instruction from teachers properly if they had been given many instructions at the same time.

Perception will not affect what a student sees or how it sounds like but it involves how the brain interprets what they hear and how they respond to it (Lerner and Kline, 2006). Students with visual perception problems can see the words on paper, but they cannot read it properly and sometimes they even left out reading some words.

Meanwhile, students with auditory perception problems is having trouble hearing spoken sounds. They will misunderstanding on the instructions given and are unable to interact well with people around them.

Fletcher et al., (2007) state that students with learning difficulties also experience memory-related problems. This problem is related to either their long-term memory or short term memory.

In addition, information processing also involves thinking. Students are unable to identify how to relate the new information that they had received with the information that they already have in their mind. According to Schiff et al. (2009), they also do not know how to apply the existing knowledge in their learning.

Students with learning difficulties also having problems in their academic. This research is focusing on Mathematics. According to Bryant and Bryant (2008), students are unable to understand basic concepts in Mathematics or calculating skills. They are having difficulties to solve the problems too because it requires the ability to read.

In the context of this research, students with learning difficulties have difficulties in mastering the concepts and mathematical skills. Therefore, they need appropriate learning media so that they are capable to get the same education as other students. Through the research conducted, researchers would like to suggest for the exposure of media-learning in games because this method is much more interesting and suitable for implementation in the process of teaching and learning.

Arinil Janah (2009) had conducted a research on the use of snake and ladder game in class to enhance students' understanding in learning at one of the schools in Indonesia. The study involved the students in primary two of the school. The results shown is that snake and ladder game successfully enhance students' active participation and be expressive during learning. In addition, learning becomes fun with the use of media-learning. Honesty is involved in this game too.

Novarina Dina (2010) has conducted a research in FY ABA 01 Miles, Indonesia in relation to the use of the snake and ladder game, too. The research which is entitled "The Use of Snake and Ladder Game in order to Improve Cognitive Ability Among Children to Understand the Concept of Number 1-10 at TK ABA 01 Batu" is to describe the use of the snake and ladder game to enhance students' cognitive ability to understand the concept of numbers up to ten and to describe an increase in the cognitive ability of students to understand the concept of numbers up to ten in group A TK ABA 01 Batu. Through the observation, the results are:

- The use of snake and ladder game in learning had proven that it can enhance the cognitive ability of kindergarten students to understand the concept of numbers up to ten.
- Students are able to recite number one up to ten smoothly according to the sequences.
- Students can indicate a number of objects up to ten.
- Adjust the number of objects using a number of cards up to ten correctly.
- Through the experience of this activity, it is proven that this learning activity is fun and meaningful.
- Learning quality has been more innovative and can be used as motivation to do other research.

Research Objectives

The objective of the research is to identify the use of a snake and ladder game in order to improve the cognitive development of students with learning difficulties. Besides that, it is to identify the role of snake and ladder game as a medium in learning mathematics. This research had highlighted some element and also the role of snake and ladder game. Some of the questions for research are as follows:

Research Questions

- i. How does the use of the snake and ladder game can improve the cognitive development of students with learning difficulties?
- ii. What is the role of the snake and ladder game as a medium for learning mathematics?

Research Methodology

The research was conducted through qualitative research methods. Observations were carried out on five people with learning difficulties from one of the secondary schools in the district of Hulu Selangor to find out whether snake and ladder game can be used as a medium in learning mathematics. Cognitive development is the same because they are in the same class even though they are from different ages.

During the observation, data collection was using two approaches, namely (i) data recorded when the game was going on and (ii) analysis of the documentary evidence actively to collect much data for researchers to have a comprehensive report. The findings of the research are reported in order to answer the research question.

Research Result

Snake and Ladder Game is Able to Improve the Cognitive Development of Students with Learning Difficulties

Based on the research that has been conducted, the use of the ladder snake drafts is proven to be able to increase the cognitive development of students with learning difficulties. The respondent of the research shows that mathematical concepts can be established well through the game. This can be seen when every player is able to reach at the last compartment in snake and ladder game.

Apart from that, this research answered the questions that have been written by the researcher about the impact of the figures of the dice throughout the game. The question is different for every respondent. This is because every respondent acquiring the different figures to move from box 1 to box 100.

This includes the addition in Mathematics, which is a number with another number and two numbers with one number. The aim of the researchers for asking the questions is to check on the cognitive development of respondents after the game. In the end, cognitive development is happening as expected.

Therefore, it can be concluded that the snake and ladder game is able to be used to improve the cognitive development of students with learning difficulties in Mathematics. The concept of learning through playing a game brings positive results in the cognitive development of students with learning difficulties.

The Role of Snake and Ladder Game as a Medium in Learning Mathematics

Through the research, it shows that snake and ladder game helps in understanding and mastering the basic concepts and the sequence of numbers.

This is because, each sample should be developed from box to box on the game board from number 1 to 100, in order to finish the game. The respondent in this research is able to calculate and remember well the concept in numbers.

Besides that, snake and ladder game also act as a tool to understand and mastering addition and subtraction. The result from the research shows that respondent can understand addition in Mathematics better through throwing the dice and moving up on the ladder in the game. The respondent have to add up the figures shown on the dice whenever they throw to determine on how many steps that they have to take.

Whereas, the ladder in the game will give a better understanding of the addition of the numbers.

Through the research, it also shows that snake and ladder game teaching us about the subtraction in Mathematics. This is because the respondent has to reverse to appropriate compartment if they had over the finishing line through the amount that they got from the dice thrown. Subtraction has to be done for the compartment with snakes. They have to reverse either from the head of the snakes or the tail of the snakes to the appropriate compartment.

Not only that, the research also showed that snake and ladder game is able to build up interest among the respondent to learn Mathematics easily. Before this, learning Mathematics is found to be boring and most of the students are not interested to learn. In addition, playing snake and ladder game is able to improvise social skills among respondents, too. They are able to interact better with others throughout the research and they are able to follow the game and complete the game successfully.

Conclusion

Mathematics is a foundation in the management of one's life. Calculating skills mastered by students during the days at school enable them to calculate correctly and also to improve their cognitive development.

Teachers have to use many interesting and appropriate ways in the teaching and learning process so that every student can master on whatever that they have been taught and especially to the students with learning difficulties.

For students with learning difficulties, the use of snake and ladder game is effective for students to master on calculating skill. Snake and ladder game allows students to understand the concept of Mathematics easily. In addition, students can be exposed to the operations of addition and subtraction indirectly and it is also a suitable activity for leisure time. This is to promote social skills and interaction among the players. Good interaction among the players is very important for the game to go on smoothly and also to make sure that everyone is having fun with it.

In conclusion, learning while playing can be used as a strategy and appropriate teaching methods for students with learning difficulties. This is to enhance their cognitive development and also to build up their interest to be involved actively in learning.

Bibliography

- Adenan Ayob, Kamariah Abu Bakar, Zakaria Kasa & Aida Suraya Md Yunus. (2001). Multimedia dalam pengajaran bahasa melayu. Tanjong Malim: Emeritus Publications.
- Arinil Janah. (2009). Laporan Pelitian Tindakan Kelas Ular Tangga. Diperoleh pada 12 Disember 2012 daripada <http://arinilwordpress.com/2009/10/28/laporan-ptk-ular-tangga>.
- Bryant, B. R., & Bryant, D. P. (2008). Introduction to the special series: Mathematics and learning disabilities. *Learning Disability Quartely*, 31, 3-8.
- Fletcher, J. M., Lyon, G. R., Fuchs, L., & Barnes, M. A. (2007). *Learning disabilities*. New York: Guilford Press.
- Kementerian Pendidikan Malaysia. (2004). Sukatan pelajaran pendidikan khas bermasalah pembelajaran sekolah rendah dan menengah. Kuala Lumpur.
- Lerner, J., & Kline, F. (2006). *Learning disabilities and related disorders: Characteristics and learning strategies* (10th ed.). Boston: Houghton Mifflin.
- Malaysia. (2002). *Draf Akta Orang Cacat 2002*. Warta Kerajaan.
- Marilyn. F. (2011). *Special education: contemporary perspectives for school professionals*. New Jersey: Pearson Education.
- Mohd Hafis Muaddab. (2012). Sejarah Permainan Ular Tangga. Diperoleh pada 14 Disember 2012 daripada <http://hafismuaddab.wordpress.com/2012/05/22sejarah-permainan-ular-tangga>.
- Mok Song Sang. (1995). *Pedagogi 2: pelaksanaan pengajaran*. Selangor: Kumpulan Budiman Sdn. Bhd.
- Noraini Idris. (2005). *Pedagogi dalam pendidikan matematik*. Selangor: Utusan Publications.
- Novarina Dina. (2010). Penggunaan Permainan Ular Tangga untuk Meningkatkan Kemampuan Kognitif Anak dalam Memahami Konsep Bilangan di TK. Diperoleh pada 15 Januari 2013 daripada <http://library.um.ac/id/...pengguna>.

- Piaget, J. (1969). *The Psychology of the Child*. New York: International Universities Press.
- Sabri Ahmad, Tengku Zawawi Tengku Zainal & Aziz Omar. (2006). *Isu-isu dalam pendidikan matematik*. Selangor: Utusan Publications & Distributors Sdn. Bhd.
- Schriff, R., Bauminger, N & Toledo, I. (2009). Analogical problem solving in children with verbal and nonverbal learning disabilities. *Journal of Learning Disabilities*, 42, 3-13.
- Sharif Ali Sharif Othman. (1988). *Permainan Matematik di Peringkat Sekolah Rendah*. Kursus Sijil Lanjutan Perguruan (Pendidikan Matematik). Tanjong Malim: Institut Perguruan Sultan Idris.
- Suppiah Nachiappan, Ramlah Jantan, Abd Aziz Abd Shukor. (2008). *Psikologi Pendidikan*. Shah Alam: Oxford Fajar Sdn. Bhd.
- Rahman Faizal. (2010). *Permainan Ular Tangga*. Makalah Politeknik Bandung. (Tidak diterbitkan).
- Zera, D. A., & Lucian, D. G. (2001). Self-organization and learning disabilities: A theoretical perspective for the interpretation and understanding of dysfunction. *Learning Disability Quarterly*, 24, 107-118