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Understanding of Early Number and Numeration of Mathematics at IIUM Educare, Gombak, Malaysia

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Abstract

The understanding of number of Mathematics for the young children is very crucial in their life. The purpose of this study is to find out the methods used in teaching young children's construction of Mathematics.Alsoto find out the understanding and different ability between the boys and girls in early number and numeration in Mathematics. This study direct observation using checklist method. A sample size 12 children aged ranging from 4, 5 and 6 years-old consisting of 2 boys and 2 girls from selected class. The results indicate that there are three concepts in teaching and learning of early number and numeration of Mathematics (a.Memorizing the sequence of the number names, b. Symbol of the number, andc. Development model in number). In addition, the concepts for teaching in early number needed the variation and interactive approaches in model of teaching for this subject. Finally, theresults indicate that there are similarity abilities between boys and girlsfor 4 year-old and 6 year-old, while for 5 year-old, indicated that there are different abilities between girls and boys in pre-mathematics. Implications and recommendations are stated for stakeholders.

Keywords: Early Numbers, Numeration, IIUM Educare

1. INTRODUCTION

During the preschool years children display natural curiosity concerning Mathematics events and spontaneously construct an informal Mathematics. In the natural environment with and without formal instruction, they actively develop nations such as more and less and addition and subtraction. Although imperfect and different from the adult's way of thinking, this informal Mathematics is relatively powerful and indeed can serve as the foundation for the later learning of Mathematics in school. The youngest children explore, begin to group and short objects, and make comparisons. As children enter school, they may be ready for labels for their Mathematical thinking and for recording their discoveries using Mathematical symbols. According to [1], mathematics should continue to be a manipulative activitythroughout the early childhood years. Development and learning pattern exhibited by children themselves in daily life situations of the home and community can bring some understanding about the way children deal with formal learning situations in school.

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Statement of the Problem

Children are Mathematical thinkers outside of school. The challenge is to keep that interest, enthusiasm, and curiosity alive in the school setting. Teachers must make real efforts to make mathematics easy for children to understand[1]. Mathematics is as the science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement and transformations. Moreover, for young children, mathematics is a way of viewing the world and their experiences in it. It is a way of solving real problems. It is an understanding of number, operations on numbers, functions and relations, probability and measurement.The purpose of this study is to find out the methods used in teaching young children's construction of mathematics at IIUM Educare, Gombak. This study also attempts to construct number meaning through real-word experience and by using physical materials. The researcher hopes that the findings will be supplement to the efforts of the principal and policy makers in assessing the Educare needs and accordingly recommend appropriate action.

The research questions of this paper are as follows:

1. What is the early number and numeration that child can learn from mathematics?
2. What is the early number and numeration in mathematics ability related to gender differences?

As mentioned at background of the study, that the consistent to emphasis on children using abstract number and performing actions on the materials to develop conceptual structures about number and numeration at the complete of a set in mind of the child.The study was carried out in IIUM Educare, Gombak. The researcher focus only on children's abilities with early number of mathematics. This study depended totally on observation at IIUM Educare, Gombak. The assessment on this study should not be generalized to other childcare in other institution.

Literature Review

As children encounter the many uses of number, they need to interpret the uses and make meaning of the numbers. The uses of number can be summarized as sequence, counting, cardinal, ordinal, measure, and nonnumeric. When the number names are verbally recited in the standard sequence without referring to objects, they are being used in the sequence context, it calls "*rote counting*" the counting context of number. Also referred to as "*rational counting"* involves matching each object or event with a number name.

In early numbers for pre-school there are many types related to number of mathematics for children's cognitive development. However, this study only attempts to observe the cognitive

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development for children at IIUM Educare, Gombak. The researcher only focuses at counting process, connecting counting and matching the numbers, thinking in groups and to know the meaning for large numbers-numeration.

There is considerable evidence to suggest that very young children can identify the number of items in a series when the size of the series is relatively small [2]. However, there are children who arrive in school at 5 years old with very little understanding of counting and number recognition. When children are familiar with counting, writing and operating simple addition using objects with numbers from one to ten, a number line can help to develop children's skills of counting-on, using addition and early multiplication through repeated addition sequences.

Psychologists offer two different explanations for hownumber words and the act of counting take on meaning. According to [3], children must understand the logic of relations (serial ordering) as well as classes to comprehend equivalence relationships and hence the meaning of numbers. For example the equivalence of one to one correspondences.

For the most part, counting ability develops in a hierarchical factor; a counting skill becomes more automatic and requires less attention to execute. In [4], one skill can be executed efficiently, it can be simultaneously processed or integrated with other skills in working (short-term) memory to form an even more complex skill [3].

Young children spontaneously and informally learn about number before formal schooling [5]. Between the ages of 2 and 5, the children can memories the number words, come to understand that each word represent a different quality, and develop their counting skills. According to[5], that child seems to understand that three (3) is more than two (2) at a very early age; however, understanding that all numbers represent specific quantities and learning to count many objects accurately are gradually developing processes.

Through handling "objects" very young children are able to begin to develop Mathematical understanding. Edward in [2] in the early stage, for example handling objects enables children to develop their sorting, classifying and counting skills. This will lead to combining and partitioning objects to develop the computation skills of addition and subtraction; grouping sets of object to develop skills of multiplication, division and fractions, and exchanging object to develop an understanding of place value.

Prior to coming to pre-school level, the handling object with making connection could enable children to learn about their properties and components. Moreover, through a range of play activities with different collections of toys, building materials, water, sand, etc., children are

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able to rationalize their experience into generalizations through manipulation, sorting and classifying, and by talking to adults and other children.

2. RESEARCH METHOLOGY

The main purpose of this study is to observe the cognitive ability of child development by direct observation and observation using checklist method. It is also covers the sampling, instruments, data collection procedure, and data analysis.

Sample Size

The sampling method was used in conducting this case study at IIUM Educare, Gombak. The researcher purposely selects individual and sites to learn, observe and understand the reality of the situation. According to [6] the number of samples for qualitative research could be ranging from 1 participant to 40 participants. Therefore, the researcher was select twelve (12) children aged ranging from 4, 5 and 6 years old as the sample size of this study. The researcher observed four (4) children consist of (2 boys and 2 girls) was selected from 4 years old class, four (4) children consist of (2 boys and 2 girls) was selected from 5 years old class, and other four (4) children (2 boys and 2 girls) was from 6 years old class. Therefore, the comparison of children's cognitive ability can be observed with differentiate between age and gender groups.

Table 1. Distribution of Sample Size

NO	Year Old	Male	Female	Total
1	4 years old	2	2	4
2	5 years old	2	2	4
3	6 years old	2	2	4

Instruments

The researcher conducted direct observations by using checklist. According to [5] that a checklist is a register of items that the observer marks off it, and they are present, behavior or details not on the checklist are ignored. The purposes of checklist are used primarily to assess the current characteristics of an observational subject, to track changes over time, and to provide information.

Teachers can use checklist to make quick notes of what children actually do in the classroom. This information is valuable for determining which children are interested in which activities or which children have accomplished given tasks.Teachers can use the information obtained from checklists for evaluating learning areas and for reporting to principal or parents.

Most checklists are constructed by teachers and used in a variety of activities, although some may be supplied by the district, state, or other administrators. In addition, most teachers who use

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checklists find that it is most helpful to have variety activities. Checklists are appropriate for gathering factual information, not for determiningthe curriculum of the programme.

Data Collection Procedures& Data Analysis

The researcher got the permission letter from Postgraduate and Research Office to the principal of Educare IIUM, Gombak, to ask permission to conduct the study. The letter informs of the purpose and nature of the study before doing the real observation. The researcher wasassigned with a particular class (four to six year-old).The selected children were approached. This study was qualitative research by direct observations. The researcher observed the teaching and learning process in mathematics class at Educare IIUM, Gombak to get the information to answer all the research questions.

3. RESULTS AND DISCUSSION

This study was divided into two sections (Section A, & Section B). Section A will be answered research question no: 1 (What is the early number and numeration that child can learn mathematics?) Section B will be answered research question no.2 (What is the early number and numeration in mathematics ability that relate to gender differences?)

Section A

This section contains 3 concepts in teaching and learning process in Educare IIUM, Gombak. The following concepts are used in this study:

1. Memorizing the sequence of the number names,
2. Symbol of the number, and
3. Development of a model in number.

The child's understanding and learning of Mathematical concept for the child is dependent on his/her understanding of it, so as the teachers, and principal have responsible to provide the good planning and suitable curriculum for the children. The children's development of above concepts progresses through several stages by using a checklist which are discussed below:

The Result of Concept 1 (Memorizing the sequence of the number names)

In 4 years old, the teachers started orally counting the sequence of number names, from 1 to 10 together with all children. The researcher seen that the way to memorize the sequence of number names by counting loudly. For instance: One, two, three, four, five, six, seven, eight, nine, and ten. After finishing above activities, the teacher tried to ask one by one to memorize the sequence of numbers. Teacher asked toAmin...Amin…. please, for example. Memorizes the sequence of numbers from one to ten. "I'm teacher, one, two, three, four, five, six, seven, eight,

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nine, and ten". Moreover, many children were asked to memorize…, than spontaneously the child were said… I'm… I'm.. I'm…teacher. According to [7] the memorizing the number, symbol, shape, and colours will be of immense assistance for child to identify objects, colours of vehicles, car number, hand phone number, home addresses. A proper handling of the subject by competent teachers will assist the child to recognize the mighty power of Allah in creating natural objects in various shapes, sizes and colours. As the Qur'an encourage finding solution to solve the problem, child also exposed to solve Mathematical problems using counting sticks, bottle tops, stones and other materials surrounding him/his.

In addition, at 5 year-old, the way to memorize is similar to the approaches found with 4 year-old class, but in this age were more numbers compared to 4 year-old class. While in this class, the researcher found thatthe teacher asked to memorize the sequence of number from 10 to 50 without asking to memorize together, but only by drawing the numbers on whiteboard than asking child such as the teacher write number "25" than asked what number is it.. and so on.

Finally, at 6 year-old class is totally different way to memorize the sequences number names, the teacher only drew the clue number on the whiteboard, than the child memorize. The researcher found that one child of this class, when he started to memorize, he started to hold his hands for long time. In this class very interactive teaching method was used between the teachers and the children and the learning process was occurred.

The Result of Concept 2 (Symbol of the Number)

As the constructivist paradigm based on Piaget's theory of cognitive development has long provided the theoretical framework for educational practice in which children acquired concepts through active involvement with the environment and constructed their own knowledge as they explored their surroundings. Applying this theory to mathematics has led the symbol of the number that enable young child to count, engage in active learning, and develop concepts[8].

The researcher found that the teacher has been seen to take the role of providing a variety of materials and arranging an environment that is rich in materials and choices. For example, the teacher hanging the numbers on the wall, and others material that provided in the classroom in IIUM Educare, Gombak. As result, the symbol of the numbers is very important thing to encourage the child to learn mathematics in the right way to release the symbol of the numbers by providing the symbol of the number in the surrounding of classroom.There is small different in providing the symbol of the number between class for 4 year-old to 6 year-old. In 6 year-old class, the teachers were given a more advance numbering investigation to carry out the problem

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that need to solve. For instance, 10 + 5 =? Or 9 + 7 =? And so on. The researcher found that one of children of this class using his hands and feet as tools for counting the numbers.

The Result of Concept 3 (Development Model in Number)

The researcher was observed the development model in number at 4 year-old to 6 year-old. Every class have different approaches to teach this concept in different ways. For example, at 4 year-old is about the model of shape and the concept of more and less, when the teacher drew the picture on whiteboard about the model of shape such as; rectangle, triangle, cube, and star. There was one child shown his ability to mention the above shape. From the observation, it can be seen that the children in this Educare is very active and cooperative in learning process. Guberman confirms that young children are like to show their ability with competition each other[9]. Interestingly, in 4 year-old, the children can recognize the shape of the star, triangle, and cube. However, the children in 4 year-old cannot differentiate between "cube and rectangle". According to[8] children of 4 years can understand the relationships of "more-less-the same".

In 5 year-old class, the researchers found that "Matching of number with the object" is very interesting, the way to teach, demonstrate and the way to approach. The teacher has variation model of teaching operation of number:

1. One-to-one correspondence, it is fundamental component of the concept of development model in number. This concept was easily understood by the child, each child has the same number of things as another. It is preliminary to counting and as the basic to understand the number.
2. Ordinary Counting, is the number name indicates the position of something in a series. For example; first, second, and third
3. Counting-on is the processes of counting by continuing count a group of objects and continue from the total when an additional group of objects are added, without needing to start once again. For example (……Five, six. Seven…..).

By using above variation of teaching in this concept, the children of 5 year-old can apply this concept to higher level counting and the same time they can involve equivalence of number. Moreover, in this class the teaching and learning occurred.

In addition, at 6 year-old, the teacher was introduced the concept of matching. For example, small object to big, dividing of things, comparing the number and objects. Introducing the concept with interactive activities, so the children feel enjoyed and they are understood with that concept.

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Section: B

This section will be answered RQ 2 (What is the early number and numeration in mathematics ability that relate to gender differences?). Table 2 (Pre-Mathematical Concepts for 4 year-old) shows that there are similarity abilities between boys and girls at memorizing the sequence of number names and symbol of the number, moreover, there is small differences in the abilities such as the expression in quality of number and the model of shape.

Table 2. Pre-Mathematical Concepts (4 year-old)

No	Concepts/Stages of Development	Boy		Girl	
		A	B	A	B
1	*Memorizing the sequence of number names*				
	a. 1 to 5	√	√	√	√
	b. 6 to 10	√	√	√	√
2	*Quality of number*				
	a. No 4	√	√	√	√
	b. No 5	√	√	√	√
	c. No 6	√	√	√	O
	d. No 7	√	√	√	O
3	*Symbol of the number*				
	a. No 4	√	√	√	√
	b. No 5	√	√	√	√
	c. No 6	O	O	O	O
	d. No 7	O	O	O	O
	e. No 8	O	O	O	O
	f. No 9	O	O	O	O
4	*The model of shape*				
	a. Rectangle	√	√	√	√
	b. Triangle	√	O	√	√
	c. Cube	O	O	√	√
	d. Star	√	√	√	√
5	*The concept of development*				
	a. thick/thin	O	O	X	X
	b. tall/short	√	√	O	O

Comment :

Code	Key to Checklist
√	Demonstrates behavioral knowledge of the concept
O	Demonstrates partial behavioral knowledge of the concept
X	Does not demonstrates any kind of knowledge of the concept

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Table 3. Pre-Mathematical Concepts(5 year-old)

No	Concepts/Stages of Development	Boy		Girl	
		A	B	A	B
1	*Memorizing the sequence of number names*				
	a. 10 to 19	√	√	√	√
	b. 20 to 30	√	√	√	√
2	*Symbol of the number*				
	a. No 10	√	√	√	√
	b. No 12	√	√	√	√
	c. No 25	√	√	√	√
	d. No 29	√	√	√	√
3	*Matching of the number*				
	a. Quality & Symbol (1 to 5)	√	√	√	√
	b. Quality & Symbol (6 to 12)	√	O	√	√
4	*The concept of development*				
	a. More and less	√	O	√	√
	b. Big and small	√	O	√	√
5	*Ascending number*				
	a. 5 to 10	√	√	√	√
	b. 10 to 20	√	√	√	√
6	*Descending number*				
	a. 10 to 1	√	O	√	√
	b. 20 to 10	X	√	√	√

Table 3, shows, there are 6 steps of concept of development for pre-mathematics at Educare, IIUM, Gombak (memorizing the sequence of number names, symbol of the number, matching number, concept of development, ascending number and descending number). The researcher found that in 5 year-old class, the abilities for the girls are more competent for above concept for pre-mathematics compared with the boys.

Finally, Table 4 shows that the Pre-Mathematical concept for 6 year-old consists of 5 steps (memorizing the sequence of number names, symbol of the number, additional of tens, money value and time). The abilities in pre-Mathematical concepts with 5 steps in 6 year-old between boys and girls had similar abilities. Almost children in class can recognize the concepts of pre-Mathematical.

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Table 4: Pre-Mathematical Concepts(6 year-old)

No	Concepts/Stages of Development	Boy		Girl	
		A	B	A	B
1	*Memorizing the sequence of numbernames*				
	a. 20 to 30	√	√	√	√
	b. 30 to 40	√	√	√	√
2	*Symbol of the number*				
	a. No 20	√	√	√	√
	b. No 26	√	√	√	√
	c. No 33	√	√	√	√
	d. No 40	√	√	√	√
3	*Additional of tens*				
	a. 2 + 8 =	√	√	√	√
	b. 4 + 6 =	√	√	√	√
	c. 5 + 5 =	√	√	√	√
	d. 9 + 1 =	√	√	√	√
4	*Money value*				
	a. RM 1.00	√	√	√	√
	b. RM 0.50 cent	√	√	√	√
	c. RM 0.20 cent	√	√	√	√
	d. RM 0.10 cent	√	O	√	√
5	*Time*				
	a. Hours	√	√	√	√
	b. Half past	X	√	√	X

4. CONCLUSION

Development of young children and learning pattern as shown by children in daily life at home and community can bring some understanding about the way children deal with formal learning situations in classroom [1]. The findings of present studyare based on research question. The study has found that the children at Educare, IIUM, Gombak can early number and numeration in mathematics by using three concepts namely: memorizing the sequence of the number names, understanding the symbol of the number and developing model in number. In the same time, the rule of teachers and the way of teaching are very important to create the conducive environment in learning mathematics for the children. In addition, there is a similar ability for 4 year-old between boys and girls. However, in 5 year-old there is a different ability between boys and girls for descending number. Finally, there is no difference between boys and girls for 6 year-old in five stages of Pre-mathematics concepts.

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