International Journal of Academic Research in Business and Social Sciences
2017, Vol. 7, No. 10
ISSN: 2222-6990

Analysis of Numerical Understanding Analysis for Primary School

Siti Rahaimah Binti Ali
Faculty of Human Development, Universiti Pendidikan Sultan Idris
Email: rahaimah@fpm.upsi.edu.my

DOI: 10.6007/IJARBSS/v7-i10/3427 URL: http://dx.doi.org/10.6007/IJARBSS/v7-i10/3427

Abstract
This study aims to examine the level of understanding of Fourth Year student numeracy based on Critical Numeracy Model. The four levels in the Numeracy Understanding Model (NUM) applied in this study are de-coding, meaning-making, application and analysis. The respondents of the study consisted of six students from standard four (4) selected based on the results of the monthly mathematical test from two persons of each level; brilliant, simple and weak. This study uses qualitative design by applying the interview method for collecting data. The interview series contains five assignments to determine the level of understanding of respondents' numeracy. The study finds that a student is at the application level that is able to solve all the learning activities that involve mathematical concepts and facts, selecting and defining procedures and providing the reason for each answer given. Three students are at the level of meaning-making. The students' ability at this stage is able to elaborate the basic facts, explain, define and formulate the operations used in learning activities. The rest are students who are at the level of de-coding, at which point they can read, understand, express mathematical terminology, list terms, identify mathematical concepts, visualize and draw on key ideas and delegate them in the form of UNM model. In conclusion, UNM is able to identify the level of understanding of numeracy and to identify the mistakes of students. This study also implies the need to improve the method of numeracy understanding among students in primary schools through UNM.
Keywords: Model of numeration understanding level, De-coding, Meaning-making, Application, Analysis, Numeration.

1.0 INTRODUCTION

Numeracy in Malaysia is introduced in the curriculum at primary level beginning since the New Primary School Curriculum (KBSR) was introduced in 1983. Numeration at primary level encompasses the basic skills of calculating, as well as being able to understand simple mathematical ideas. The significance of numeracy is the basis for continuity of mathematical learning to a higher level, but it is also a platform for learning other subjects. When the curriculum was re-enacted into the Primary School Integrated Curriculum (KBSR) in 1993, numeracy emphasis was continued to help students develop basic numeracy skills. In line with that, the numeracy exercise requires skilled teachers to apply math knowledge (concepts and skills) in numeracy teaching to students. Thus, the government's intention to see students to

master basic numeracy skills after attending primary school education will be achieved. In 2010, the Ministry of Education Malaysia (KPM) has implemented a first numerical screening to Year One students, 46% surpassing the numeracy stage (KPM, 2010).
Numeracy is part of math, in particular numeracy is the ability to perform basic mathematical operations and understand simple mathematical ideas and apply mathematical knowledge and skills in daily life (Curriculum Development Division, 2010 & MOE, 2012). Knowledge of numeracy is very important to learn from the early stage because the numeration involves the identification of numbers, calculation, measurement, geometry, probability and statistics (Ginsburg, 2006). In Malaysia, key subject for elementary school mathematics education includes the numeracy aspect that students need to learn at primary school stage.

Based on the description of the primary mathematical syllabus, in Malaysia the numeracy was introduced starting from Year One (Curriculum Development Division, 2010). For Year one subject according to KSSR (Primary School Standard Curriculum) is divided into two categories namely number and operation; consists of whole numbers, plus and minus, fractions and money. Category two is metric and geometry; Time and duration, length, weight, volume and space. The fourth year still uses the KBSR (Primary School Integrated Curriculum) syllabus, the introductory titles start with round numbers, fractions, decimals, money, time and duration, length, weight scales, liquid volume, shape and space. However, both metrics include aspects of numeracy at primary level.

Therefore, numeracy understanding needs to be applied to students as early as learning (KPM, 2010; O'Donoghue, 2002). This is because many of the students are reported to only understand the algorithm without knowing the reason behind the operation performed and can be applied in everyday life (Brown et al, 2003; Earle, 2003; Bobies, 2005; Clarke, 2004). Understanding the numeracy at primary level determines excellence at a higher level. This is because with the numeracy understanding in the classroom the students can apply numerical knowledge in everyday life (Westwood, 2008). For a local study, According to Noraini Idris (2003) study on whole numbers addition scheme to three students form Year Two and three students from Year Three at a primary school in Kuala Lumpur, she found that numeracy concepts such as the concept of ten, collection concepts, number concept and numeracy skills, play an important role in helping students build a robust whole numbers scaling scheme. It is found that pupils can complete the addition because the numeration concept has been known by the students from the beginning. Therefore, the mathematical education process focuses on the formation of a numerical basis in order to seed and enrich the interest knowledge, attitudes and values of aesthetic to produce a generation of math cultures (KPM 2001a). With this an individual is capable of exploring knowledge, making adaptations, modifications and innovations in complementing or handling future changes and challenges. This goal is in line with the statement of national education philosophy (PFK).

However, according to Noraini Idris (2000) who conducted clinical interviews with two primary school students, it was found that words like "square" and "rectangle" were not part of the common vocabulary for them. According to her, there are still students cannot describe or represent the words "square" and "rectangle" as well as geometric shapes similar to the so-called words, meaning that the students still cannot describe words with geometric shapes.

In the 1990s, the NSW Department of Education & Training, (2001,2002) and Brown (2003), have conduct a study on a group of students to review students' understanding of numeracy and the reasons for weakness in numeracy. In Malaysia, the aspect of numeracy understanding needs to be given attention because the objective of primary school mathematics curriculum is to develop students with a balanced understanding of the concept and skills so that the skills to be able to applied in real life (KPM, 2002, 2006).

2.0 PROBLEM STATEMENT

Students' ability to understand numeracy is critical because this numeracy is considered as a key in mathematical learning (Askew et al., 2007). Walmsley (2009), Kalitatidou (2008), and Star (2005) analyzed the study and past paper on numeracy and reported that there are various approaches and efforts have been done extensively by researchers to find solutions to help students master the level of numeracy comprehension. However, until now the mathematician's education is criticizing the difficulty of learning the numeracy especially in the understanding of the heading, fraction, multiplication, geometry, and problem solving (Dave, 2010).

Reflections and surveys in action studies show that sometimes students do not know why they are having difficulty understanding the numeracy. Students find it difficult to get the mathematical concepts taught and remember and associate current learning with past learning (Tagg, 2006). There are students who experience difficulty in recalling factual numbers and mathematical concepts that involve their numeracy comprehension. Sometimes the skill of understanding and interpreting the needs of questions, diagrams, and mathematical problems as well as the ability to express systematic mathematical steps with meaning is also very difficult for some students. This situation prevents the calculation and solving of mathematical problems. The researcher who taught Mathematics at a national primary school for 10 years among students aged 7 to 12 years, found that many students felt difficult when studying mathematics and understanding numeracy.

This situation is more clearly seen in the achievement of the national examination for Mathematics. Students who score below Grade C are unable to master mathematically completely. Grade C is the minimum determinant of student enrollment, referring to the grading scale of the school by the penaziran system (KPM, 2010). The UPSR results in 2010 and 2011 show that the number of students receiving Grade D and E is over 15%. Based on the Ministry of Education (2011) report, the results of the Primary School Assessment Test (UPSR) show that primary school children in Malaysia have difficulty responding to questions requiring numeracy understanding, especially for questions requiring calculations involving the use of basic calculations and problem solving.

According to them, pupils also lack of control over the subject found in numeracy, which are geometric subject, numbers, algebra, and data. This is because TIMSS examinations are taken when students are in Form Two, but the scope of the examination is based on the subjects of primary school level. Therefore, a strong numeracy understanding of the primary school level is important for the understanding of the students to be sustainable at the secondary level (White, 2010).

The numeracy achievement in Malaysia is still moderate according to reports made by the National Key Result Areas (NKRAs) in 2008. It is found that 24% of Standard Four students still do not have good achievements in the use of basic calculations. In addition, about 20% of students in Malaysia failed to achieve the minimum TIMSS benchmark for Mathematics in 2007, compared to only 5% to 7% in 2003. This is especially important as education quality needs to be improved in line with the country's aspirations. This is supported by the study of Van de Rijt et. Al. (2010) found that students in Asia were weak in numeracy comprehension. Mathematical achievement is an interesting and very important thing in primary school (Noraini, 2009). Mathematical achievement is often seen as a key factor in ensuring the success of students in the school system (Curriculum Development Center, 2010).

For Standard Four student, weaknesses in misunderstandings of basic numerical concepts, especially in solving the problematic problems are apparent especially in the level of interpretation of the code and the process of acquiring knowledge. This can be further verified by the analysis by the State Education Department of Kelantan (2012) which shows that in the mid-year Mathematics test, for problem solving questions especially in identifying operating bases for use in solving problematic problems, students are still weak to identify which operations will used. Students at primary level are identified as having significant weaknesses in basic skills in mathematics (Sabri, 2006; Suhaidah, 2006). Additionally, there are students who misunderstand the concept, easy to forget, do not know problem solving strategies, and negligent. They also tend to learn the algorithm by memorization.

3.0 STUDENT OBJECTIVES

This study aims to explore the level of understanding of Fourth Year students in primary school. Specifically, the objective of the study was to evaluate the level of numeracy comprehension for the Fourth Year students according to the Numeracy Understanding Model.

4.0 UNDERSATNDING OF NUMERACY MODEL FRAMEWORK

The UNM framework consists of four stages, namely de-coding, meaning-making, applying, and analyzing (Luke and Freebody, 2009). This model framework is built with the aim of determining the level of understanding of numeracy of students, generally primary school students and especially Year Four students. Because of the numeracy comprehension is complex (Ball, 2002, Kilpatrik, Swafford, and Findell, 2001), this study focuses on the development of UNM adapted from critical numerical modeling (Luke and Freebody, 2009; Watson, 2008) Student numeracy comprehension.

The UNM emphasizes four stages that each contains the specific features each student needs to achieve. When all these levels of understanding of numeracy can be mastered by students, it can be concluded that they have fully reached the level of numeracy comprehension. This model has some important elements in developing numeracy understanding among students. Among them, it gives students the opportunity to understand numerical concepts and understand context before understanding more complex thinking. Secondly, it provides opportunities for exploring with others such as in pairs, groups, or class discussions where different views can be collected. Third, giving students the opportunity to create something that uses their new knowledge, especially explaining the results to peers, and then preparing answering the exam questions (Watson, 2008).

Therefore, through UNM pupils can tap into ideas and link the relationship between ideas to solve the problem given (Ludlow, 2004). This UNM can also be used as a checklist for teachers and pupils to see an understanding of one topic that has been implemented and explore other types of thinking. Students can analyze the given questions. This UNM makes it easy for students to express their thoughts and apply them through everyday life (Siti Rahaimah & Noraini, 2013).

This checklist provides questions such as what the thought has been made; do you need to explore other kinds of thinking, and what happens when analyzing the question. This model makes it easier for students to use them so that what comes to mind can be written and expressed at the stages of this UNM. Through this model, each idea can be categorized according to their respective levels.

Through the numeracy model of this numeracy understanding, students can think of various strategies used in the stages. Students need to get acquainted with this rank. At the beginning, they takes a long time to adapt to learning, if this thing continues, it will became a habit. Students can also use this numeracy model in other subjects. This is supported by White (2010) and Penny Munn (2005), which suggests that in order to develop student understanding, during and after walking activities students may be asked to reflect their thinking with questions such as "what is the numeration idea you want to know more about the results of the this investigation".

The next process, which is to identify what needs to be done and how the process takes place is difficult (Wiliam, 2000a). Difficulties in identifying steps and subsequently developing pupils' understanding (Watson, Callingham, and Donne, 2008a). Numeration involves different ways of solving problems. There is not only one way to get the right answers. Students find it useful to discuss the types of strategies they use in their real life (Watson, 2008).

Therefore, the UNM also helps students to provide evidence and give arguments for any reason or answer given. Through this model, students are given confidence and are trained to defend the ideas given so they know what they are saying. This will give the student a constant confidence and can argue for a given decision.

For each numerical question, the solution steps according to the numeration model should be in accordance with the procedures and features that have been determined based on the grade in the UNM. This facilitates the process of identifying each student for their numeracy understanding level based on the answers to the questions raised. This model framework also gives students the opportunity to learn how to constructivism approaches, bringing new knowledge links to what they already know, building their own understanding, and making new meaning. This approach can help students to recognize the numerical characteristics in everyday situations (Gal, 2002) more thoroughly.

Based on this UNM framework, pupils can develop numerical understanding through their environment. This will help students develop ingenuity so that they can make a socially and economically balanced decision and apply it to everyday life. The model itself can act as a transformation tool for teachers in helping them to get out of the ordinary teaching method. However, this model needs to be practiced in teaching and learning so that it is compatible with students to practice in numeracy learning.

This model can also help students build and understand numerical concepts. Students bring their own knowledge and ideas to think of ideas that emerge in the mind of thought. Through this numerical modeling framework, learn what students know as early exploration, brainstorming, challenging questions, quizzes and questions require students to think. So the role of a teacher in front of the class is to investigate the initial understanding of the pupils by using some initial activities that can help them focus on what the teacher is doing and to remind them of what they already know. Teachers can put some questions into thinking, exploring different phenomena, and asking them to contribute ideas.

This UNM framework can trigger in-depth numerical ideas by topics in mathematics. Students are given examples of questions to familiarize themselves with and help students familiarize themselves with de-coding and meaning-making acquisition, then to the next stage, using (applying) and analysis (Luke and Freebody, 2009). Through this model, creative students can be helped to use the understanding they have to solve a question.

UNM is designed to address the problem of student understanding of numeracy. This is because there are teachers who make the teaching and learning process disappointed because the students do not understand the concept and do not understand what to say. Therefore, the process of teaching and learning goes smoothly by gaining the right ideas and the ability to draw a strong conclusion based on mathematical reasoning can be applied. These skills can be called critical numerals defined by Stoessier (2002). There is a clear analogy with critical numeracy, which involves the awareness that all texts represent different views of the world (Statue, 2007).

5.0 STUDY DESIGN

This study uses the Fourth Numeracy Understanding Model (UNM) consist of four stage, the first stage, coding; Second stage, meaning-making; Rating. Third, application; and the fourth rating, an adapted analysis and critical numeric framework by Luke and Freebody (2009). This model is used to determine the level of understanding of numeration in Fourth Year students. This interview procedure based on UNM is used during and after the student completes the task to get the information to answer the research questions. The interviews are appropriate and meet the UNM characteristics and complement each other
Resources to get the desired results (Cresswell, 2007).

This study is a qualitative study to clarify the level of understanding of student numeracy for Fourth Year students. This study uses interview procedures to answer the research questionnaire. This approach is very appropriate to answer the question of the study that was built according to the purpose of the study. This method is meaningful because each method has its own advantages and disadvantages (Patton, 2002). Hence, this study has the potential to explore the level of understanding of numeracy for Year students
Four.

6.0 SELECTION OF SAMPLE AND PLACE OF STUDY

For this study, the study participants were Six year four student who were selected based on three categories, two excellent people, two moderate and two weak according to the results of the monthly Math test. They have been studying KBSR for three years. The method of selecting the participants of the study was based on the written agreement obtained from the school, the students themselves, and their parents with the advice of the school's Mathematics teachers. This qualitative study was carried out not for the purpose of generating research findings to the Fourth Year generation. Therefore, the probability sampling method is unnecessary (Merriam, 2002). The participants were selected based on their ability, willingness, commitment, and motivation to provide the information required in the current study.

The location of the study was at one of the primary schools in Kota Bharu, Kelantan. The location of the study was based on the written permission of the Kelantan Education Department, after it was approved by the Education Policy Planning and Research Division (EPPR) and Kelantan Education Department.

7.0 STUDY INSTRUMENTS

This research instrument was developed by a researcher based on a critical numericy modeling framework (Luke and Freebody, 2009) involving numeracy. Purification of the research instrument was conducted at some stage during and after the pilot study was conducted.

Activity counting content on each task is referred to from the Fourth KBSR Syllabus Description, textbooks, and previous studies. Overall, five interview sessions were formed to answer the research questions. Each session takes between 30 to 35 minutes.

This instrument is an important component of obtaining the information needed to answer the research questions (Creswell, 2008a). The required study instrument depends on the purpose of the study (Matthijsse, 2000). With this task, the research is more systematic, focused, and has high reliability (Merriam, 2001). For Merriam (2001), research assignments should be able to process, clarify, and formulate immediate data.

The first interview consisted of one task consisting of three activities namely one task activity (T1A1), one task activity two (T1A2), one task activity three (T1A3). T1A1 contains two questions related to numbers and calculations, T1A2 has two questions relating to calculations, and T1A3 has two questions regarding calculations and length measurements. The second interview focuses on basic calculations, spaces and shapes, and fractions. In this second task, there are three different activities, two task activities (T2A1) related to the breakdown and calculation, the two activities of two (T2A2) in relation to the calculation and space and form, while the task of two activities (T2A3) as well as time and duration.

The third interview consists of three tasks, one task (T3A1), three tasks (T3A1) related to the calculation, the task of two activities (T3A2) related to fractions, calculations, and volume of fluid, and the three activities of three (T3A3) Data calculations and representations. The fourth interview consists of three tasks (T4A1) with four activities (T4A1) related to fractions, money and calculations, task four activities two (T4A2) related to length measurements and space and form, task fourth activities three (T4A3) Related calculations as well as space and form as well. The fifth interview consists of three tasks, namely five task-related activities (T5A1), a five-tasking task (T5A2) in relation to calculations, fractions, spaces and forms, task five activities of three (T5A3) Solid liquid as well as space and shape. All the activities carried out are all four levels, namely the first level, the interpretation of the code; Second stage, meaning-making; Third rank, application; And fourth, analysis.

8.0 PROCEDURE OF COLLECTING DATA

This study uses interview techniques to collect data. Interview procedures according to the UNM are used to obtain the findings in parallel with the study question, which is to identify the level of understanding of numeration and the mistakes of the students when answering the given assignment.

Schoenfeld (2002) states that interviewing methods are also known as "out-loud" approaches to help researchers obtain individual information in depth. With the same view, Peter & Castel (2009) also concedes that the interviews allow for the obtained results to be more practical for use in the field of mathematical education. According to Johnson (2004), a qualitative study is an intensive study of an individual or situation. Interview techniques were used in this study

International Journal of Academic Research in Business and Social Sciences
2017, Vol. 7, No. 10
ISSN: 2222-6990

because of their advantages in making individual assessment of the assignments constructed during interviews, as well as allowing researchers to look and see the results of the assignments performed by students during an interview session.

Based on the guided questionnaire, the researcher uses five tasks during the interview process. Interview procedures according to the characteristics of MKPN are combined with five tasks to identify the level of understanding of numeracy participants of the study. This interview procedure is based on the stages found in UNM, de-coding, meaning-making, application, and analysis in order to know the level of their real numeracy understanding.

9.0 DEPARTMENT AND DISCUSSION

This section aims at identifying the level of understanding of the numeracy that the participants of the study of numeracy are starting with the number headings, basic calculations, fractions, measurements and geometry. Interviews are analyzed separately so that the conduct of the study participants can be formulated.

The findings of the interviews on six Fourth Year respondents to evaluate the level of numeracy understanding based on the Numeracy Understanding Model are summarized in Table 1 below:

Table 1:
Summative Stages of Understanding for Six Respondents from Year Four

Stage De-coding	Stage Meaning-Making	Stage Application	Stage Analysis
PK5	PK2		
PK6	PK3	PK1	
	PK4		

The stages of this numerical understanding are obtained from the five assignments given and respondents are interviewed during the course of the activity. Based on Table 1, only PK1 is a person who reaches the application level stage, while those who achieve meaning-making stage are PK2, PK3, and PK4. PK5 and PK6 dominate the code level interpretation only. In the fourth stage of the analysis stage there is no one respondent who can respond to the characteristics of all activities given based on UNM.

10.0 RESULTS FROM THE INTERVIEW

The quote below is an example that illustrates the behavior of one of the students in the third stage which is application. Among the exception of quotes showing him beyond the third stage is;

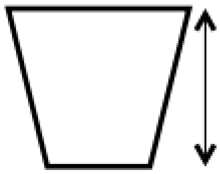
Excerpt 1 (iii) T2A2

P : Try reading (assignment is placed on a table)
M : There are 13 chickens. Five chickens died. How many live chickens live?
Q : How many chicks do you have at first?
M : 13teen.
P : Try writing.
M : (Write "13").
Q : What does "die" mean?
M : Minus
Q : How Many?
M : Five.
P : Try writing down the mathematical sentences.
M : (Writing "13 - 5 =).
Q : How many chicks are alive?
M : (Take 13 marbles by counting one by one) 1, 2, 3 ...., 12, 13. Minus 5 (remove 5 out of 13 marbles by counting one by one 1,2, 3, 4, 5. (Number of marbles remaining) 1, 2, 3, 4, 5, 6, 7 and 8 (eight).
Q : Which chicken dead?
M : This (show 5 marbles)
Q : Which chickens are alive?
M : This (show 8 marbles). (Tk1T2A2)

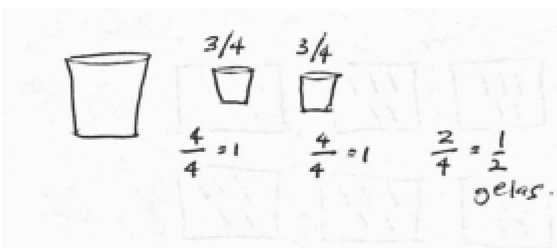
An Exhibit 1 (iii) T2A2 above it is found that PK1 can solve, associate the concept, select and determine the appropriate procedure to complete the given task. He can explain the operation used by declaring the minus operation with the meaning of "dead". He was able to relate the mathematical concept of the problem of mathematical form to writing in the form "13 - 5 = ( ) ". He also linked the concept by using a marble simulation to solve the problem, "(taking 13 marbles by counting one by one) 1, 2, 3, ... 12, 13. Push 5 (removing 5 out of 13 marbles by counting one by one 1, 2, 3, 4, 5. (Counting the marrow balance) 1, 2, 3, 4, 5, 6, 7 and 8 (eight) "As shown in Tk1T2A2 When asked again about the minus operation, he stated" This (shows 5 marbles). "Based on the above statement it is clear that PK1 can link a mathematical concept even if problem solving is given.

Excerpt 2 (iii) T3A2

(Picture glasses are available in front of pupils)



P : Let's say one glass has a maximum charge of 3/4. If you want to measure orange juice by 2L by using the glass, how many glasses are needed?
M : (Silent for a moment) two glasses.
Q : Try to explain your answer?
M : (Respondents painting glasses pictures)



(D1T3A2)

P : Try to tell us what you are drawing.
M : This large container has two liters of orange juice, these two small cups can take 3/4 only. We want two glasses, this is not up to two liters yet.
Q : How do you know it's up to two liters?
M : If 4/4 is one liter, two glasses do not mean the same two liters. He's even more three, four, two ... two glasses,2/4 more.
Q : What do you mean by 2/4 more. Please give your reasons.
M : In one glass, take half.

In Exhibit 2 (iii) T3A2 above, PK1 solves the problem of orange juice by drew a large container and says it contains 2L of orange juice. Later, he drew two glasses and stated that each glass had a 3/4L of orange juice as shown by D1T3A2. Next, PK1 said "we want two glasses. This is less than two liters "in T2T3A2 quotes showing he expected two glasses to be still inadequate to measure 2L of orange juice. Next, PK1 explains that there is an excess of 2/4L orange juice again after being measured with two glasses. According to PK1, 2/4L orange juice is equivalent to half glass, which is one of two parts of the glass.

11. SUGGESTIONS AND SUMMARY

Understanding numeracy model is an innovation that is created in line with the curriculum in Malaysia. This model is one of the "thinking strategies" branches in producing students and in line with the implementation of School-Based Assessment (PBS) that has been implemented now in all primary and high school schools.

The findings of this study have contributed to the development of knowledge and contribution to teaching theories and training. From the aspect of knowledge development, in-depth study of cognitive Year Four students in mathematics education is still limited, especially in numeracy comprehension. Given the numeracy understanding is very important for students in the early stages of schooling, the results of this study can contribute towards the improvement of knowledge in the field of numeracy comprehension. The knowledge can then be used to help teacher's to make appropriate model activities in their teaching and learning processes to the students, rather than just the curriculum aspect.

The findings of this study are also important to expose teachers to the importance of modeling an appropriate approach based on self-esteem for the students because the understanding is the basis to diagnose the student's capability individually based on certain learning environment and situation.

The primary teachers' training center, the Teacher Institute of Malaysia (IPGM), plays an important role in establishing an efficient trainer teacher in pedagogical science that focuses on resources, technology, curriculum, methodology. Since mathematics is a concept that cannot be transferred from a teacher to students, teaching approaches that are too dependent on language speech have limitations. Therefore, the findings of this study provide guidance to IPGM and IPTAs in particular to specific building elements, as well as the theory of behavioral and information processing in the mathematical curriculum. It is important that the direction of mathematical education of the country be in line with other developed countries with a better mathematical position at the world level.

Aspects of the contribution to theory, this study is important because it can add TKR-based studies, primarily focusing on the exploration of student numeracy understanding which is rarely given the focus of research among supporter of radical constructivism. This study also contributes to the development of research design, data collection techniques, clinical interview instruments, data analysis methods, and summarizing research findings from the aspect of radical constructivism. Aspects are important because they can provide guidance and references thoroughly and completely to other researchers.

Corresponding Author
Siti Rahaimah Binti Ali
Faculty of Human Development
Universiti Pendidikan Sultan Idris
Email: rahaimah@fpm.upsi.edu.my

References

Earle, L. W. (2003). *Watching and Learning 3. Final report of the External Evaluation of England's National Literacy and Numeracy Strategies.* Toronto: Ontario Institute for Studies in Education Unoversity of toronto.

Gal, I. (2002). *Adult Numeracy Development:theory, research, practice.* Hampton press.

Ginsburg, L. (2000). Instructional straregies for adult numeracy education. *Adult numeracy development:Theory, research. practise* , 89-114.

Ginsburg, L. Manly, M., & Schmitt, M.J (2006). *The component of numeracy*. Cambridge, MA: National Center for the Study of Adult Leaning and Literacy

Askew, M. B. (2007). Effective teachers of numeracy. *London School of Educational* .

Bahagian Pembangunan Kurikulum (2010). *Programme literacy and numeracy screening (LINUS).* Kuala Lumpur:, Pusat Perkembangan Kurikulum.

Bahagian Pembangunan Kurikulum, (2010). Bahagian Sekolah Rendah. *Program Literasi dan Numerasi (Linus)*. Kementerian Pelajaran Malaysia

Ball, D. (2002). *Mathematical proficiency for all students: Toward a strategic research and development program in mathematics education.* RAND Education/Science and Teknology Policy Institute.

Bass, H. (2005). Mathematics, Mathematicians and Mathematics Education. *Bulletin of the American Mathematics Sociaty 42 (14)* , 417-430.

Bobies, J. C. (2005). Supporting teachers in the development of young children's mathematical thinking:Three Large scale cases . *Mathematics Education Research Journal 16(3)* , 27-57.

Brown, M. A. (2003). The key role of educational research in the development and evaluation of the National Numeracy Strategy. *British Educational Research Journal 29(5)* , 663-680.

Brown, M. A. (2003). The key role of educational research in the development and evaluation of the National Numeracy Strategy. *British Educational Research Journal 29(5)* , 663-680.

Clarke, D (2004). *Mathematics teaching in Grades K-2: Painting a picture of challenging, supportive and effective classrooms. In R.N Rubenstien & G.W Bright (Eds). Perspectives on the teaching of mathematics (66th Yearbook of the National Council of Teachers of Mathematics.* Reston,VA:NCTM.

Creswell, J. W. (2007). Q*ualitative Inquiry & Research Design Ed. ke-2.* London: Sage publication.

Dave Baker, A. T. (2010). *Navigating Numeracies home/school numeracy practices.* London: King College.

Department of skill (2011). *Literacy And Numeracy.* Dublin: Department of Education and Skill.

Dowker,A. (2005). Early identification and intervention for students with mathematics difficulties. *Journal of Learing Disabilities*, 38, 4, 324-332.

bers sense and related misconceptions about selected rational number concepts exhibited by prospective elementary teachers. Disertasi tidak diterbitkan. South Florida: University of South Florida.

Kementerian Pelajaran Malaysia (2009). *Huraian Sukatan Pelajaran Matematik Tahun 4.* Kuala Lumpur: Pusat Perkembangan Kurikulum.

Kementerian Pelajaran Malaysia (2010). Bengkel Kajian Semula Pelan Induk Pembangunan Pendidikan . *Teks Ucapan* .

Kementerian Pelajaran Malaysia (2011). *Laporan prestasi UPSR*. Kuala Lumpur: Lembaga Peperiksaan Malaysia.

Kementerian Pelajaran Malaysia Malaysia, K. P. (2003). *Kurikulum Bersepadu Sekolah Rendah: Huraian Sukatan Pelajaran Matematik Tahun 4.* Kuala Lumpur: Pusat Perkembangan Kurikulum.

Kilpatrick, J. S. (2001). *All adding it up: Helping children learnmathematics.* Whingston Dc: Nasional Academic Press.

Lembaga Peperiksaan Malaysia (2011). *Analisa prestasi dan gred purata matematik.* Kuala Lumpur: Lembaga Peperikasaan Malaysia.

Luke & Freebody. (2008). A map of possible practise: futher notes on the four resource model practically primary. *Journal Research Mathematics Education, 4(2)*, 5-8.

Luke & Freebody (2009). *Critical numeracy.*Numeracy in the news, Fakulty of Education, University of Tasmania.

Martin and D. Schiffer. *A research companion to principles and standards for school mathematics* , 68-98.

Matthijsse, W. (2000). Adult numeracy at the elementary level: Addition and subtraction up to 100. In G. Iddo, *Adult Numeracy Development: Theory,research, practise* (pp. 133-155). UK.

Merriam, S. (2003). *Qualitative research and case study research in education.* San Francisco: Jossey-Bass Publisher.

Merriam, S. B. (2001). *Qualitative research & case study applications in education*. San Francisco: Jossey – Bass Pub.

NCTM. (2000). *Principles and standard for school mathematics.* USA: Reston, Va Author.

New South Wales Department of Education and Training (2001). *Count me in too professional development package.* Ryde: NSW Department of Education and Training.

New South Wales Department of Education and Traning. (2002). *Teaching about angles: stage 2.* New South Wales: Ryde NSW.

Noraini Idris (2009). Penyelesaian masalah daya penggerak dalam pengajaran dan pembelajaran. *Persidangan Kebangsaan Pendidikan Matematik.* Sungai Petani: Institut Pendidikan Guru Malaysia.

Noraini Idris (2000). *Linguistik aspects of mathematical education: How precise do teachers need to be? In Cultural and Language Aspects of Science,Mathematics and TechnicalEducation.* Universiti Brunai Darulsalam.

Noraini Idris (2003). Mathematics learning in English as a second language. *Diges Pendidik, 4(1)* , 64-72.

O'Donoghue, J. (2002). Numeracy and Mathematics. *Math. Soc. Bulletin 48* , 47-55.

Patton, M. (2002). *Qualitative evaluation and research methods. Ed. ke-3.* Thousand Oaks, CA:Sage Publishing.

Peters, E., & Castel, A. (2009). Numerical representation, math skills, memory, and decision-making [Peer commentary on the paper "Numerical representation in the parietal lobes: Abstract or not abstract?" by R. C. Kadosh & V. Walsh]. *Behavioral and Brain Sciences,* **32,** 347-348.

Penny, M. (2005). Explanations of mathematicsal concepts in Japanese, Chinese, and U>S first and fifth-grade classrooms. *Cognition and Instruction, 18* , 181-207.

Pusat Perkembangan Kurikulum. (2010). *Programme literacy and numeracy screening (LINUS).* Kuala Lumpur: Bahagian Pembangunan Kurikulum, Pusat Perkembangan Kurikulum.

Sabri Ahmad. (2006). *Isu-isu dalam pendidikan matematik*. Utusan publication distributer sdn. Bhd.

Schoenfeld Allan.H (2002). Research method in (Mathematics) education. Dlm L.D. English, M.

B.Bussi, G. A. Jones, R. A. lesh & D. Tirosh (eds),. *Handbook of international research mathematics education* , 432-487.

Siti Rahaimah & Noraini Idris (2014). *Numerasi sekolah rendah*. UPSI

Siti Rahaimah & Noraini Idris. (2013). A model to identify the level of numeracy understanding of primary school pupils: A case study. *International Journal of Computer Application* (0975-8887) (Journal Electronic) Vol. 67 no.5, April 2013.

Siti Rahaimah & Noraini Idris. (2013). A model to identify the level of numeracy understanding of primary school pupils: a case study. *Jurnal Pendidikan Sains & Matematik Malaysia*. Vol.3. No.2 Dis. 2013. pp. 24-42.

Star, J.R (2005). Reconceptualizing procedural knowledge. *Journal for research in Mathematics education, 36(5)*, 404-411.

Statkus, S. (2007). What is critical literacy (and how do I use it)? Practically Primary, 12(3), 10–12.

Stoessier, R. (2002). An Introduction to critical numeracy. *The Australian Mathematics Teacher, 58(4)*, 17-21.

Strategy Numerasi Kebangsaan. (2011). *Primary framework for literacy and mathematics.* Department of eductional and skill.

Suhaidah Tahir. (2006). Pemahaman konsep pecahan dalam kalangan tiga kelompok pelajar secara keratan lintang. Tesis Phd.tidak diterbitkan, Universiti Teknologi Malaysia, Skudai. Johor.

Tagg, A. (2006). *Do they continue to improve? Tracking the progress of a cohort of 'longitudinal students. In finding from the numeracy development projects 2006.* Wellington: Learning Media.

Van de Rijt, B.A.M, Van Luit and A.H. Pennings. (2010). The construction of the Utrecht early mathematical competence scale. Educational and Psychological Measurement, 59, 289-309.

Walmsley, A. (2009). Mathematics roots: Understanding Aztec and Mayan numeration systems. *Journal Research Mathematics Educatin, Volume 12, Issue 1*, 55.

Watson, J.M, Callingham, R, & Donne, J (2008a). Establishing pedogogical content knowledge for teaching statistic, In C. Batanero, G. Burrill, C. Reading & A. Rossman (2008), *Joint ICMI/IASE Study: Teaching Statictics in School Mathematics.* Proceedings of the ICMI Study 18 and 2008 IASE Round Table Conference. Monterrey: ICMI and IASE and JASE. Online:www.stat.auckland.ac.*nzl-iase*/publications

Watson,J. (2008).The early numeracy test in Finnish*:* children norms. Scandinavian *Journal of Psychology*. 47(5):369-378, 2006 Oct.

White,A. L. (2010). Numeracy, literacy and newman's error analysis. *Journal Of Science And Mathematics Education In Shouheast Asia*. Vol. 33, no.2, 129-148.

William, D (2000a) *Integrating formative and summative functions of assessment*. Paper presented to the WGA 10 for the International Congress on Mathematics Education 9, Makuhari, Tokyo. Available from http://www.dylanwilliam.net/