Newman Error Analysis For Errors In Mathematical Word Questions Among Year Three Students In Sekolah Kebangsaan Taman Kluang Barat

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Abstract: This research was conducted to better understand the reasons behind the errors made by primary school students through error analysis methods of Newman and to identify types of errors made during the solving of mathematical problems, in particular, mathematical word problems. In addition, the author chooses to review this topic to assess the effect of the method chosen by students to answer mathematical problems as well as studying students' attitudes towards mathematics as a subject, especially in solving mathematical word problems. Through this study, students are examined through five levels of Newman Error Analysis namely in terms of reading, understanding, transforming thinking, applying process skills and written calculations. This study involved 10 students of Year Three in Sekolah Kebangsaan Kluang Barat in Kluang District, Johor. The five types of instrument used in this research are namely the respondent information form, a written test problem solving whole number, individual questionnaires, the analysis form on types of algorithm's errors, and attitude questionnaires.Data were analysed by descriptive analysis that will explain in detail the tendency of students to make mistakes in a particular phase of Newman Error Analysis The outcomes demonstrated that the students are competent enough at the primary phase of Newman's Model (Read and Recode). However, they faced challenges in performing at the second to fifth phase of Newman's Model (Comprehension, Transformation, Process Skills and Encoding). Among the mistakes were wrong calculations, unclear handwriting, incorrect values, failing to show the mathematical working steps and incorrectly showing algorithm calculation.

Keywords: Newman Error Analysis; mathematics achievement; attitudes towards mathematics.

1. INTRODUCTION

Malaysia's aim in learning Mathematics, the Government has outlined Mathematics in line with the current technology and science circulation. Higher Order Thinking Skills' (HOTS) or higher-level thinking such as analysis, synthesis and assessment of students through their own mathematical subjects to enable students to better deal with more difficult problems and to cope with the current and emerging trends of globalization. this 21 century. As stated by (Powel, 2015), mathematics is a problem-solving and challenging and complex thing to solve and requires the right techniques. Most students have difficulty solving problems, especially in the life of mathematical questions that really test students' thinking level (HOTS). Stated by (Ambrus & Barczi-Veres, 2016), that this type of question has been a problem for students since time immemorial. The mathematical problem of course is to be solved by requiring students not only to find the final answer but to require students to understand and have skills in dealing with related questions such as reading what is being read, translating questions into mathematical sentences, selecting appropriate math strategies, practicing

skills the process for the selected strategy, the calculation and finally the encoding of the answer. Therefore, it is not an easy process if students do not master the skills presented to find life-long math problems.

The problems faced by students in mathematics and especially mathematical storytelling cannot be overlooked and underestimated because mathematical mastery among Malaysian students is at an alarming rate as the majority of students in Malaysia have low mastery and computation (Nooriza & Effandi, 2015) . The government incorporates the content of questions containing high-level thinking skills (GNI) into math as they see it, and maths is constantly being revised over the years since the New Elementary School Curriculum (KBSR) has been changed to the new Primary School Integrated Curriculum (KBSR). Primary School Standard (KSSR).

According to a study conducted by Pujiadi, Kartono and President M. (2015), 70% of all the mistakes made by the students in the two countries Australia and Malaysia is based on the categories of understanding, transformation and negligence which concluded that the pattern of different errors occur for different problem questions. The observation was made through the use of techniques of Newman error analysis method. Another study conducted by Riswan, Sudia M and Kadir, 2018 have concluded that 84.4% of students make the following mistakes; not writing what is known, not writing responses which are appropriate and in accordance with the question and there are also questions that are not answered at all due to student not understanding the question. 46.6% of students make mistakes where they do not understand how to answer or the method used. Next, 32.2% of the students make mistakes during the process of substitution and elimination. In fact, as many as 42.2% of the students are writing the final answer that has nothing to do with the context of the question or some students do not write any answer at all.Among the reasons that affected the findings are that the students could not transform the questions from a word sentence to a mathematical sentence, do not understand the questions, negligent, lack of time during the assessment and the lack of practice in questions with varied forms of story.

Using the Newman Error Analysis allows the errors of the students to be identified more easily. Therefore it is easier to see whether students have problems in terms of perception, thinking transformation, computing skills, applying process skills and creating or applying the coding responses.

2. METHODOLOGY

2.1 Criteria of Study

This study used the systematic literature review method to review relevant published articles on this topic. Four criteria were applied in selecting the articles. First, the articles were published in a 5-year time frame between 2015 and 2019. Secondly, this literature review was done on published articles only. Thirdly, the articles were published abroad in the English language. Finally, this study considered both quantitative and qualitative approaches.

2.2 Search Strategies

The search was conducted using a specific search term which is "Newman Error Analysis" The databases used were ERIC and Google Scholar. Titles and abstracts were examined carefully to identify technology-oriented research in the learning of Mathematics among students.

3. FINDINGS

A total of 26,257 articles were found in two different databases, 17,400 articles in Google Scholar and 8,857 articles in Eric. 6,050 articles were rejected because they do not have the full text. The rest of the articles were then refined based on the five-year time frame. A total of 8,429 articles were removed to narrow down to the latest articles on the use of Newman Error Analysis in Mathematics learning.

Each article was then filtered through careful reading of the abstract. Consequently, 20,192 articles were excluded. The selection was made based on the criteria during the systematic review. Finally, a total of 10 relevant articles were found to have met all criteria, with 5 articles from ERIC and 5articles from Google Scholar.

3.1 Location

All the selected articles were studies conducted outside Malaysia. The 10 studies came from 19 countries, as shown in Table 1.

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Table 1: Location of the selected studies

Country	Number	Author (Year)
Afrika	1	Khalo & Bayaga (2015)
Vietnam	1	Duong & Nguyen (2017)
Indonesia	7	Tatag Yuli, Ahmad Wachidul & Ika Kurniasari (2016),Sumule, Amin & Fuad (2018),Kristayulita, Ipung, Abdur Rahman & Cholis (2016), AriefAulia & Fauziana (2018), An Nur, Imam & Mardiyana (2017), Arief, Sukestiyarno, Ismarto et al., (2019), Kenys & Firda (2017)
Filipina	1	Siniguian (2017)

Most of the studies were carried out in the Indonesia. with seven studies, followed by Afrika, Vietnam, and Filipina with 1 studies. All these studies sought to elevate the current education system to become at par with the current Fourth Industrial Revolution (4IR) era.

3.2 Participants

The sample of the selected studies consisted of teachers, university students, secondary school students, primary school students, and pre-school students. The different types of sample selected by the studies are shown in Table 2.

Table 2: The sample of the selected studies

Sample	Number	Author (Year)
Teachers	1	Tatag Yuli, Ahmad Wachidul & Ika Kurniasari (2016)
Primary school students	1	Duong & Nguyen (2017)
Secondary school students	5	Abykanova et al. (2016), Al-Takhyneh (2018), Herrador-Alcaide and Hernández-Solís (2017), Israel (2016), Umoh and Akpan (2014)
College and University students	3	Siniguian (2017), Kenys & Firda (2017), Iwan, Amin, Endang & Chin (2015)

The majority of these studies secondary school students as their sample and their amount is five respectively. Only 1 studies involved a sample of both teachers and primary students.

Findings provide an outcome of the results and it was analysed through research conducted and the results were provided to the respondents. The analysis was done by obtaining reports about the background of the respondents.

The demographic information received was then described in the form of percentages and recorded in a systematic table form.The authors found it easy to get a clear picture of the background of the respondents involved in this study. Background information of students includes gender and ethnicity and also the occupation or career of their parents. Other tabulated information includes; whether the first question was answered correctly, the percentage sources of error based on the Newman Error Analysis Procedures and the percentage of the types of algorithm errors made, percentages as well as descriptive statements regarding the attitude of students towards mathematics and especially in solving mathematical word problems.

4. DISCUSSION

Most of the students involved obtained really poor marks of 0 to 4 out of 10 or 0% to 40%. However the score was much better for an easy question such as Question 1 where 80% of the students got the answer and solution right. The 20% of the students that failed to answer the question correctly did not manage it because of poor reading skills. The skill of the

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student in reading comprehension is a major determinant in the ability of being able to successfully solve mathematical word problems.

The inability to properly understand the context of the story in the mathematical word question is a major reason the question was not understood clearly.This would then cause students to have low self confidence in their abilities which would affect their motivation and determination in learning the mathematics subject as a whole.

Furthermore, the lack of reading comprehension causes the inability to convert the word sentences to mathematical sentence or expression. This is especially true for students who are generally weak in studies. 60% of students involved in the research faced a tough time in choosing the correct mathematical operation such as addition, subtraction, multiplication or division. Therefore the calculation would be incorrect which results in a wrong answer. This is most likely due to the weakness in recognising the correct symbol for the operation involved.

The failure in coding response and algorithmic writing also causes the inability to get the correct answer. The research shows that 65% of the errors made were of coding response which was the highest of all the error categories. The weakness of the students stems from the inability to write the correct sequence of numbers and symbols in the mathematical sentence without help and guidance from their teacher.

Students take the easy way out by writing the numbers in the same order of the question without analysing it correctly for example, $298 + 65-70$, or $8560 \div 8$ and so on.

Some students were able to answer math questions in school but they still failed to correctly perform similar calculations in everyday life situations (Sari, Darhim & Rosjanuardi, 2018).

The development of an individual's knowledge can only be achieved by the establishment of links between different mathematical situations and experience in solving math problems in everyday life. Students do not require logical and critical thinking skills in solving basic math problems.

The development of one's knowledge can only be achieved through the formation of interrelationships between different types of experiences solve problems in everyday life. Students do not have to think logical and critical. Errors such as neglect to recognize operating symbols, misconceptions, misconceptions writes a place value, cannot put a normal / vertical shape number during the calculation and continue to give answers without any counting techniques (Ulu, 2017). The survey form shows 100% of students love math, but 90% of the students do not solving mathematical storytelling on challenging factors. Student difficult to make them wise to make decisions, and understand to solve the question. Teacher is the catalyst for coping students' weaknesses and improving their teaching techniques by the waydelivering more creative and innovative ways through the latest technologies.

5.   CONCLUSION

This study shows that the average Year 3 student of Sekolah Kebangsaan Kluang Barat is not able to complete all 10 Mathematical questions correctly. Mathematical word questions are a major barrier for the students. The students seem to face a lot of confusion in carrying out mathematical operations of addition, subtraction, multiplication and division. Such negligence should not be a barrier to students in the process of mastering mathematics. The type of errors being committed by the students as per Newman's analysis should be the driving force in future improvements.

Therefore, teachers can play an important role in helping students master mathematical word problems by providing adequate training. Parents can also play a role in this by giving their children adequate exposure to mathematical word problem solution videos on YouTube, mobile applications on the Play Store and also on education channels on the television.The Government's stated aim can only be achieved when students are able to correctly interpret and answer mathematical word problems.

5.1 Teachers Can Perform Alternatives

This study was limited only among Year 3 Student of Sekolah Kebangsaan Kluang Barat. Therefore, teacher could perform a few alternatives such as teachers need to look for a technical mechanism and a teaching strategy or approach teaching is out of the ordinary. Teachers can do it with games and this gives the class fun and the students are more focused attention to the teaching that the teacher gives. Make Ongoing assessment needs to be carried out by the teacher

to overcome it the mistakes that pupils make. Students will be guided by the teacher is in immediate condition. Examples of assessments are practical are observations, questionnaires, tests and so on and that is all about helping students solve problems based on Newman's Error Analysis. Teachers should be aware of the students' interest in the subject matter Maths and teachers can provide students with direct experience by conducting a study visit and so on. Experience and Mathematical problem solving scenarios can sometimes be seen and experienced by pupils. Teachers can ask students to retell their experiences and situations in solving math problems in their daily lives. Developing a Math-like attitude is really necessary to deliver a lesson in school is more meaningful. Teachers can plan interesting, engaging activities bring to attend talks, campaigns or competitions related to Math. Mathematical attitudes can be nurtured in students.

6. IMPLICATIONS OF THE STUDY

The findings of this systematic review offer several suggestions on Medium and elementary students of the 3rd year belong to this research. This kind of study should focus on high-performing students of the same year or so years of looking at the level they are facing similar problems for solve math storytelling problems. Sample addition can be selected by addition or enlargement height can provide a clearer picture of the research being done the type of area school, gender and race should be taken into account. Repeated studies re-evaluate the reliability and validity of the instrument taking into account the written test and the questionnaire form. Research can be done by a specific method for is used in enhancing and enhancing ownership of solutions student math problem story. According to Magen-Nagar (2016), problems of misconception or misunderstanding occur out of a lack of knowledge elementary students 3 InspiraTaman Kluang National School Kluang Barat only. This kind of work can be implemented in all primary schools the whole country or country in getting better and better results

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