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Exploring Student's Skill in Mathematics Problem Posing Using Youtubevideo as Stimulus

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Abstract: This study was conducted to explore student's skill in mathematics problem posing. Twenty four students were selected to participate in creating mathematics questions based on a given stimulus. A video on disaster was chosen as stimulus. Students were required to generate as many as possible mathematics questions within 1 h. In addition, a newspaper clipping which was related to the video was used to enhance their understanding about the disaster. They were reminded that the questions could be solved, genuine and creative. The finding revealed that out of 137 questions that the students created, 60 questions were removed due to no solution. However, when comparing the questions with the Revised Taxonomy Bloom, only three questions can be categorized at the application level, 52 were placed at the understanding level and the remaining were at the lowest level. This indicates that problem posing activity is considered new to the students. Furthermore, the thinking level in creating mathematics questions can be considered at low level. Future works have to integrate problem posing activity particularly in teaching and learning of mathematics.

Key words: Problem posing, mathematics, disaster, stimulus, students

INTRODUCTION

Generally, mathematics education focuses mainly on problem solving as compared to problem posing. This issue has been debated by various related researchers in mathematics education (Arikan and Unal, 2014). However, these two complement each other in terms of understanding the conceptual knowledge of mathematics. In addition, the concept of problem posing has been introduced by Freire in 1970 in relation to the dialogue participation (Arikana and Unalb, 2015). The concept is an alternative to traditional instructional approach which is limited in terms of quality and quantity (Mishra and Iyer, 2015).

Furthermore, some advantages of problem posing like reducing misconception in mathematics enable students to be autonomous in their learning as well as promoting flexible learning (Arikana and Unalb, 2015). The student's skill in problem posing is not extensively studied (Kojima *et al*., 2015).

Why problem posing is important? The idea in mathematics instruction is to develop that the students can be good problem solver (Schoenfeld, 1992). When the students manage to get the idea of problem posing, then,solving any mathematical problem would not create any barriers for them. Students should be given opportunity to generate mathematics questions through problem posing activities. This would boost the student's creativity and thinking skills that are vital in mathematics learning (Zakaria and Ngah, 2011). Problem posing plays important role in linking the thinking skills with the problem solving skill. It enables students to understand complicated mathematical concept through their thinking activity. Although, students would face difficulty in organizing information in problem solving yet it can be comprehended when problem posing is implemented (Arikana and Unalb, 2015). The generated questions from the problem posing activity would relate students on how to reformulate any given mathematical situation to algebraic expression. If this could be done, then the lower order of thinking skills could be achieved by students. Problem posing has been widely accepted in mathematics education through its impact.

The positive impact of problem posing has been proven in previous studies (Arikan and Unal, 2014). Nonetheless, despite the vital aspect, problem posing research is not being done extensively in Malaysia which has become the justification of this study. For instance, the focuses of the study include the relationship between problem posing and student's attitude (Zakaria and Ngah, 2011), using manipulative in problem solving and posing (Rosli *et al*., 2015), assessing student's problem solving and problem posing skills (Rosli *et al*., 2013) and meta-analysis on the effects of problem posing on student's learning (Rosli *et al*., 2014). Therefore, to promote problem posing activities, the students should be

exposed to situations that can make them think of what would be the suitable related questions. This is related to creating problems using a given situation that refers to problem posing. The situation becomes a stimulus that can trigger questions during problem posing activity. There are three types of stimulus includingfree situation, semi structured and structured (Arikan and Unal, 2014). By choosing stimulus of free situation, the respondents were able to pose any questions without any restriction. Therefore, this study was conducted to solve the following research questions:

- What are the types of the generated questions when using the video as the stimulus?
- What is the level of the questions based on the revised bloom taxonomy?

MATERIALS AND METHODS

The 24 students of 21 female and the rest were male students were selected to be the research participants. These students were postgraduate students who enrolled in master in mathematics education. A video from YouTube at https://www.youtube.com/watch?v=IzavGW3vEwUwhich is on disaster was chosen to be the stimulus for this activity. The disaster is a massive flood tragedy which happened in East Coast of Malaysia in December 2014. One newspaper clipping as shown in Fig. 1 was used to describe the related event as additional stimulus.

Buka lebih banyak pusat pemindahan

Kota Bharu: Jumlah mangsa banjir di negeri ini terus meningkat apabila merekodkan seramai 1,770 mangsa membabitkan enam jajahan, semalam, berbanding 19 mangsa, kelmarin.

Setiausaha Majlis Keselamatan Negara (MKN) Kelantan Azhar Mohamad Yusof berkata, sehingga jam 7 malam, sebanyak 26 pusat pemindahan banjir dibuka di seluruh negeri ini.

Katanya, pihaknya menjangkakan lebih banyak pusat pemindahan banjir akan dibuka berikutan hujan lebat di beberapa kawasan.

"Sehingga kini jajahan Jeli merekodkan jumlah mangsa tertinggi iaitu sebanyak 927 mangsa membabitkan 259 keluarga yang masing-masing ditempatkan di tujuh pusat pemindahan banjir.

"Jajahan Tanah Merah mencatatkan jumlah kedua mangsa tertinggi iaitu sebanyak 688 mangsa diikuti Pasir Mas (84), Pasir Puteh (31), Kuala Krai (29) dan Machang (11)," katanya.

BANJIR DI KELANTAN

Sehingga jam 7 malam tadi

DAERAH	MANGSA	KELUARGA	PUSAT PEMINDAHAN
Jeli	927	259	7
Kuala Krai	29	11	1
Machang	11	23	2
Pasir Mas	84	21	1
Pasir Puteh	31	8	2
Tanah Merah	688	170	14
Jumlah	1,770	492	27

PARAS AIR SUNGAI

- Sungai Golok di Rantau Panjang berada pada paras bahaya iaitu 9.92 meter *(paras normal 5 meter)*
- Sungai Golok di Jenob berada pada paras bahaya 24.88 meter *(paras normal 19 meter)*

JALAN DITUTUP

- Jalan ditutup untuk lalu lintas dan kenderaan
- KM 12 Jalan Chiku Aring, Gua Musang,
- KM 4 Jalan Sungai Durian/Chenulang, di Kuala Krai
- KM 2 Jalan Bukit Sireh/Kg Bedal/Kg Nal di Kuala Krai
- KM 8 di Jalan Machang-Pengkal Meleret, Wakaf Bata, Machang.

Fig. 1: Newspaper clipping on the related disaster

About 1 h was given for them to generate as many as possible mathematics questions. The students were reminded to generate mathematics questions that can be solved, genuine and creative. They were allowed to discuss among them yet the questions produced must not be the same as others. The generated mathematics questions were collected for the determining whether the questions are solvable. The questions were categorized according to the revised taxonomy bloom (Krathwohl, 2002). An expert in mathematics problem posing was appointed to validate the questions that the students generated. A specific coding was given to each research participant as RF-xx which indicates R as respondent, F for female and M for male and xx represents the numbering system which based on the sequence of the number. So, FR-01 is referred as female respondent number one.

RESULTS AND DISCUSSION

Using the revised taxonomy bloom, only 3 questions can be categorized into application level, 52 in the understanding level and 22 at the knowledge level which can be shown by Table 1. However, none of the generated questions can be categorized in any top three level of the taxonomy.

Based on the analysis, the research participants managed to generate 137 questions after the session. However, 60 questions have to be removed from the analysis since no solutions can be obtained. All questions can be considered as routine problems which focused on procedural knowledge only. It can be revealed that generating questions that have conceptual knowledge has become the student's limitations. However, this finding is not consistent with what has been done by Silver and Cai (1996). Their research participants were able to produce questions that achieved the required complexity level. The questions that were generated by these participants required the lower order thinking which focuses on remembering process. However, learning mathematics does not limit to memorizing formula and procedures (Schoenfeld, 1992). It is beyond that limitations and involves higher order thinking to enable students to explore the solutions as well as patterns.

Next, to have a better understanding, two-sample problems were picked for the purpose of discussion. Based on Fig. 2, the sample problems were generated by

Table 1: Analysis of number of questions based on the revised taxonomy bloom

Category in revised taxonomy bloom	No. of questions
Application	3
Understanding	52
Knowledge	22

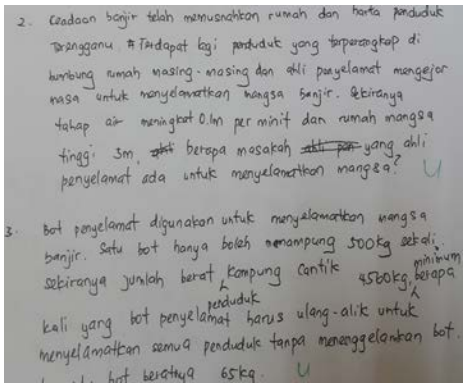

Fig. 2: Sample of problems by FR-20

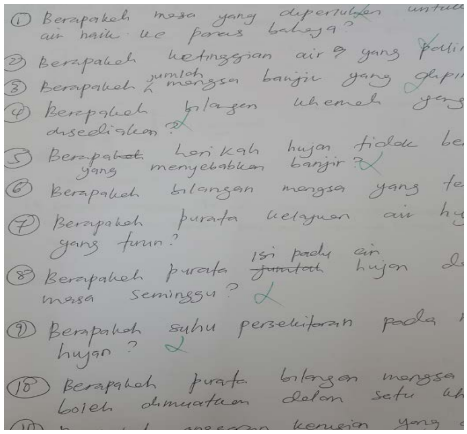

Fig. 3: Sample of problems by FR-01

a female respondent. Although, she managed to produce two lengthy questions but the quality of the questions is much better compared to the other set of questions by FR-20. FR-01 was able to give the related scenario based on what they have seen and transferred. Despite producing 11 questions as shown in Fig. 3, none of the questions have the equivalent quality as FR-01. Most of the questions used the term of "how many" in posing the questions. When reading the questions by FR-01, it triggered student's thinking. Furthermore, indirectly, a critical thinking aspect can be developed through this activity. The student's understanding of related mathematical concept can be enhanced when they are able to generate good problems.

Using the YouTube video as a stimulus in this research, it has become an alternative in problem posing activity. Playing the role as a stimulus, the video helped the students to create questions based on the given scenario. Instead of the two stimuli in this study, there are unlimited materials in the environment that used the same function.

In addition, student's engagement is also prioritized in ensuring the chosen problem posing the activity that benefits them. It will improve teacher's questioning technique since the generated problem gives an idea to them about the student's thinking level. It connects the conceptual knowledge and procedural thinking through the explicit problems (Abramovich, 2015).

CONCLUSION

Although, past researches have proven that problem posing can enhance student's thinking particularly on creativity aspect, yet many have to be done in ensuring the problem posing gives impact towards mathematics learning. Through this activity, students are supposed to construct their mathematical knowledge which can increase their cognitive activity. This activity can be promoted to any mathematics teachers in order to instil the vital part of creating questions among students. Let the students create the questions that suit to their thinking level. Types of the created questions imply the level of their thinking which can be used in categorizing their understanding of the particular topic. Indirectly, this can increase student's achievement in mathematics. The problem posing activity can be varied depending on the classroom situations as well as the student's level. Educators have to be creative in making the activity fun and able to achieve the required expectation from the students.

REFERENCES

Abramovich, S., 2015. Mathematical problem posing as a link between algorithmic thinking and conceptual knowledge. Teach. Math., 18: 45-60.

Arikana, E.E. and H. Unalb, 2015. Investigation of problem-solving and problem-posing abilities of seventh-grade students. Educ. Sci. Theor. Pract., 5: 1403-1416.

Arikan, E.E. and H. Unal, 2014. Development of the structured problem posing skills and using metaphoric perceptions. Eur. J. Sci. Math. Educ., 2: 155-166.

Kojima, K., K. Miwa and T. Matsui, 2015. Experimental study of learning support through examples in mathematical problem posing. Res. Pract. Technol. Enhanced Learn., 10: 1-18.

Krathwohl, D.R., 2002. A revision of bloom's taxonomy: An overview. Theor. Pract., 41: 212-218.

Mishra, S. and S. Iyer, 2015. An exploration of problem posing-based activities as an assessment tool and as an instructional strategy. Res. Pract. Technol. Enhanced Learn., 10: 1-5.

Rosli, R., D. Goldsby and M.M. Capraro, 2013. Assessing students mathematical problem-solving and problem-posing skills. Asian Soc. Sci., 9: 54-60.

Rosli, R., D. Goldsby and M.M. Capraro, 2015. Using manipulatives in solving and posing mathematical problems. Creative Educ., 6: 1718-1725.

Rosli, R., M.M. Capraro and R.M. Capraro, 2014. The effects of problem posing on student mathematical learning: A meta-analysis. Int. Educ. Stud., 7: 227-241.

Schoenfeld, A.H., 1992. Learning to Think Mathematically: Problem Solving, Metacognition and Sense Making in Mathematics. In: Handbook of Research on Mathematics Teaching and Learning, Grouws, D. (Eds.). Macmillan, New York, USA., pp: 334-370.

Silver, E.A. and J. Cai, 1996. An analysis of arithmetic problem posing by middle school students. J. Res. Math. Educ., 27: 521-539.

Zakaria, E. and N. Ngah, 2011. A preliminary analysis of students problem-posing ability and its relationship to attitudes towards problem solving. Res. J. Appl. Sci. Eng. Technol., 3: 866-870.