

Current Research On Problem Posing : A Review

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ABSTRACT

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Teachers and students must learn how to pose problems effectively, hence there is a need for ongoing research on this topic. In order to identify the next topic that can be explored in the field of problem posing, this study aims to capture the latest research trends regarding problem posing over the last five years, starting from 2018-2023. The method used is Systematic Literature Review (SLR). The results of this study are research on problem posing widely spread in various topics, including a) theoretical considerations of problem posing, b) the relationship between problem posing and other abilities, c) analysis of teacher problem posing abilities, d) analysis of students' problem posing abilities and e) learning design to improve problem posing skills. These findings indicate that the problem posing has been extensively researched by scholars. The development of teaching materials that involve problem posing and learning design to enhance prospective teacher problem posing skill are two potential area of future research.

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A. INTRODUCTION

Making questions based on a specific situation is known as problem posing (Cai et al., 2020). This activity is important to be carried out by both students and teachers in learning. Posing problems is crucial for teachers because it allows them to meet the various thinking needs of their students (Lee et al., 2021). Meanwhile, it's also crucial for students because one of the five steps of the scientific approach that are utilized in schools is the activity of asking questions based on a particular circumstance (Haenilah et al., 2021). Moreover, students' grasp of the subject matter can also be deepened through problem-posing exercises (McDonald and Smith, 2020).

Problem posing is an important research issue to investigate (Cai and Hwang, 2020). In the 1980s in the United States, the first study on problem posing was carried out. About 10 years later, subsequent studies developed towards classifying the types of problems posed by students. The study of Silver and Cai classifies problem posing into three different forms of mathematical cognitive activity, namely: pre-solution posing, within-solution posing, post-solution posing (Silver and Cai, 1996). Meanwhile, other studies classify problem posing into three types, namely free problem posing, semi-structured problem posing, and structured problem posing (Abu-Elwan, 1999).

Even though it has been 40 years since the first study on problem posing, research on the topic is still being done. In order to choose the next topic that can be developed in relation to problem posing, researchers need to be aware of how problem posing research is progressing. Therefore, this study aims to capture the latest research trends regarding problem posing over the last five years, starting from 2018-2023.

B. RESEARCH METHODS

This research uses the Systematic Literature Review (SLR) method, which contains explicit and detailed methods for the identification, selection, and assessment of the quality of individual studies and overall evidence but does not incorporate the overall study results (Krismadinata et al., 2020). This study uses data derived from articles from Proquest and Google Scholar. In order to capture the research trends on Problem Posing, the article search was restricted to the last five years, namely from 2018 to 2023. The keywords used are "problem posing" and "mathematics". From this search, the researcher read the existing articles one by one. Then, the researcher selects relevant and irrelevant articles. Relevant articles are articles that discuss

Problem Posing as the main topic and research conducted in the field of mathematics. From the selection process, 38 relevant articles were obtained.

C. RESULT AND DISCUSSION

In the last five years, research on problem posing has focused more on a) theoretical considerations of problem posing, b) the relationship between problem posing and other abilities, c) analysis of teacher's problem posing abilities, d) analysis of students' problem posing abilities and e) learning design for improve problem posing skills. A summary of the research results is shown in Figure 1.

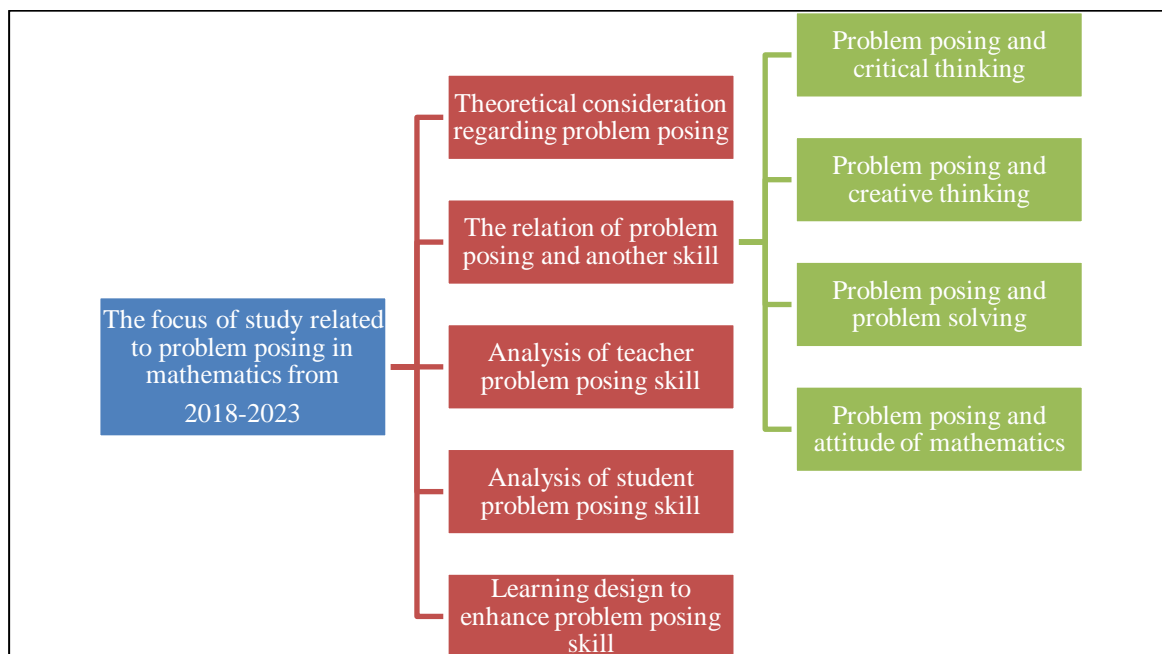


Figure 1. The Summary of Focus Study Related on Problem Posing in Mathematics restricted from 2018-2023

1. Theoretical Consideration Regarding Problem Posing

There have been a lot of studies on problem posing over the last 40 years. Due to the variations in the problem posing contexts, these researches cannot be contrasted with one another. As the consequences of that, at least two articles questioning the accepted concept of problem posing have been published in the previous five years. These include research from Cai and Hwang (2020) and Papadopoulos et al. (2022). Cai and Hwang offered the following definition of problem posing after compiling seven expert viewpoints on the subject. They offered the problem posing in the context of mathematics education as a number of related types of activities that require or assist teachers and students in creating (or reformulating) and presenting a problem or assignment based on a specific situation (referred to as the problem context or problem scenario) (Cai and Hwang, 2020) Meanwhile, Papadopoulos, et. al. classifies defines problem posing into five sections, namely a) problem posing as generating new problems, b) reformulating already existing or given problems, c) both generating new and/or reformulating given problems, d) raising questions and viewing old questions from a new angle and e) an act of modeling (Papadopoulos et al., 2022).

2. The Relation of Problem Posing and Another Skill

Several researchers have explored the relationship between problem posing and other abilities. In those studies, problem posing serves as the ability or approach employed in learning. As an approach, problem-posing in the classroom also has been shown to enhance student critical thinking skills (Kertiyani et al., 2022; Supandi et al., 2020). The problem posing process which occurred when student try to think creatively has been studied by Isnani et al. (2020).

Other researches show that the problem posing approach can help students develop their creative thinking skills (Hendriana et al., 2019; Titikusumawati et al., 2019). According to Daher and Anabousy, problem posing has a considerable impact on increasing creative thinking skills, specifically in fluency, flexibility dan originality (Daher and Anabousy, 2018).

Moreover, problem posing approach also contribute to the improvement of problem-solving abilities (Cahyani et al., 2020; Nuraeni and Rosyid, 2019). Both an offline and an online problem posing approach can help student become better at solving problems (Dwita, 2020). It gives student more chances to understand things on a deeper level (McDonald and Smith, 2020)

In addition, problem posing also influences another aspect of students, such as their attitudes of mathematics (Rosaini et al., 2019). In the terms of gender, attitude of female students was better than male students (Deringöl and Guseinova, 2022).

3. Analysis of Teacher Problem Posing Skill

Problem-solving abilities are crucial from the teacher's perspective because they allow teachers to match the way their students think (Lee et al., 2021). However, several research, demonstrate that teacher problem posing abilities are still not optimal (Nofrianto and Jumrawarsi, 2019). Gender, demographics, and the teacher's educational background all have an impact on the teacher's capacity to pose problems (Busaka et al., 2022). On the other hand, the duration of instruction time does not correspond with the teacher's problem posing ability (Peng et al., 2022).

Other research looked into the challenges teachers have in refining their problem-posing abilities. It can be challenging for teachers to create questions that use the same information but have varying degrees of difficulty (Hošpesová et al., 2021). Additionally, certain teachers are still hesitant to ask or create questions for their students because they fear that their students won't be able to respond to them (Ramadianti and Priatna, 2019). Because of this, the teacher poses questions less frequently, which hinders the development of their problem-posing skills. Some teachers struggle with this skill because they were never exposed to problem posing while they were students and are not accustomed to it. Additionally, teachers typically limit the types of questions they ask to those included in the text (Chavarría-Arroyo and Albanese, 2023) so training is still needed to help teacher pose problems (Liljedahl and Cai, 2021).

4. Analysis of Student Problem Posing Skill

In terms of students, research examines more aspects of students' problem-posing abilities. Several studies on elementary school students show that elementary school students still do not know what they know about the problems, so they have difficulty asking questions related to problem solving (Isrokatun et al., 2021). The ability to ask questions (problem posing) is still a big challenge for students, but it is worth trying to improve (Kovács et al., 2023).. Meanwhile, other studies explain that students at the basic level are actually able to create questions that can be solved in a variety of different contexts (Bevan and Capraro, 2021). Most students in elementary school can answer their own questions and continue to ask them even though it is recommended that they use other forms of questions (Martinez and Blanco, 2021).

Aside from elementary school students, studies on problem-solving abilities were also conducted on junior high and senior high school students. Several research have looked at the aspects that influence a person's problem posing abilities, such as material understanding and teacher teaching approaches (Suri et al., 2021), student optimism (Zulfikar et al., 2020) and learning styles (Evendi et al., 2022). Prior knowledge can also predict students' problem-solving ability ((Calabrese et al., 2022). Previous mathematical competence in terms of mathematical exposure became a predictor of problem posing ability (Dewi and Marsigit, 2018; Espinoza et al., 2022). However, students class level cannot be regarded as a standard for problem posing abilities. This suggests that the progression of students' problem-posing abilities from elementary school to high school is not linear (Guo et al., 2021).

5. Learning Design to Enhance Problem Posing Skill

Other studies on students and prospective teachers were also conducted in terms of learning designs that might enhance problem posing skills. Analysis of learning design in painting geometry is carried out to enhance prospective teachers' problem posing abilities (Nuriyatin and Widadah, 2020). Project-Activity-Cooperative (PACE) learning models were also tested on students to improve their problem posing abilities (Afrilianto et al., 2019).

For fifth graders in elementary schools, a study was done to look at the development of learning materials based on problem-posing (Kurniasih and Asikin, 2019). Meanwhile, in high school, puzzle games can be used in the classroom to help students come up with more creative problems (Candiasa et al., 2018). In addition, learning to make questions with visual poems can also improve problem posing skills (Bataller et al., 2022).

D. CONCLUSION AND SUGGESTIONS

During 2018-2023, research on problem posing was spread over various topics, including a) theoretical

consideration of problem posing, b) the relationship between problem posing and other abilities, c) analysis of teacher problem posing abilities, d) analysis of student problem posing abilities and e) learning design to improve problem posing skills.

The study's findings indicate that there is a need for improvement in the teacher's problem-posing skills. In light of this, future research might concentrate on current or prospective teachers. Future study can focus on 1) creating examples of teaching materials that incorporate problem posing to aid instructors in applying the problem posing approach and 2) creating learning designs to enhance the problem posing abilities of potential teachers.

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