Originality Versus Non-Originality Problem Seeking

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This study describes students' implementation of originality problem-seeking and non-originality problem-seeking in resolving numeracy problems. It used a case study design. The data collection process was started by providing numeracy problems. Further, the data related to originality and non-originality problem-solving in completing numeration issues were garnered through interviews. Our data suggested that the students using non-originality problem-seeking mostly only limited the scope of the problem to the question being asked in the item. Thus, they presented relatively similar problem identification. Meanwhile, two of our participants had originality problem-seeking with different answers, completed with logical rationale. Further, those two participants also used wider scope of a problem than the problem being explicitly stated in the question item. Their problem identification was made based on their experience and analysis results.

Keywords: originality, problem seeking, numeracy problems

INTRODUCTION

Originality is defined as the capacity to create a novel method or expression that has not been explored by others (Cotter et al., 2020). An idea is perceived as original if it statistically represents a unique and uncommon response (Shamay-Tsoory et al., 2011). Thus, originality is regarded as the creation of a new idea with a singularity (Corazza, 2016). In contrast, non-originality is an idea that has no unique, new, or innovative dimension (Alajami, 2020). Meanwhile, problem-seeking represents the ability to identify the required information to resolve a problem. It employs the boundary of problem to generate the identification suitable for the problem using the students' own perspective (Lee & Cho, 2007; Reiter-Palmon & Robinson, 2009; Kozbelt et al., 2010; Hu et al., 2010; Kicheol & Kang, 2019). Therefore, originality problem seeking

is the ability to identify the required information in resolving a problem or the scope of the problem to establish the suitable identification using students' perspectives in unique, rare, and unusual quality (Lee & Cho, 2007; Reiter-Palmon & Robinson, 2009; Kozbelt et al., 2010; Shamay-Tsoory et al., 2011; Hu et al., 2010; Kicheol & Kang, 2019).

Problem-seeking is essential in the problem-solving process since it facilitates the identification of the problem's characteristics and the extent of hindrances during the problem-formulation process (Nickerson et al., 2012). After the qualities of the problem and the prospects for the solution have been identified, the problem-solving process is efficient (Rubenstein et al., 2021). Getzels (1979) also stated that the practice of problem-seeking in the problem formulation process presents more essential features than the solutions that are commonly in the form of mathematic or experimental skills. Besides, the mathematics issues in daily life are not always in the form of routine problems with clear definitions and straightforward explanations, so problem-seeking skills are crucial in the problem identification and definition process that aids proper problem solvency (Alabbasi et al., 2021). Cotter et al. (2020) also accentuate the important role of ideas' originality in resolving non-routine daily life problems. Davis et al. (2017) also explained that problem-seeking should be included in the school mathematics curriculum since it prepares pupils to deal with math problems in real life.

In real life, humans may face problems related to numeration in their job, communities, and personal life (Ginsburg et al., 2006). The problems of numbers frequently involve numerical information in different daily life activities (Fastame et al., 2019). Numeration issues are commonly unstructured and non-routine, with a variety of approaches for solving them or no complete solution (Kemendikbud, 2017). Originality is required to solve the non-routine challenge, notably in generating fresh ideas (Acar et al., 2017; Fortes & Andrade, 2019). On the other side, originality is closely correlated with problem-seeking (Abdulla et al., 2018). Therefore, originality problem-seeking is crucial in the completion of numeration issues.

In addition, the problem of numbers is also related to daily mathematics concepts and principles. Accordingly, the daily numeration issues are unstructured, present a number of resolving approaches or incomplete settlements, as well as correlated with non-mathematical factors (Kemendikbud, 2017). In completing the numeration problem, students are asked to interpret the calculation while comprehending the correlation between numbers and real-life material (Kus, 2018). Therefore, students are highly encouraged to learn mathematics using practical application context to aid them in constructing a correlation between the knowledge they acquire daily. Additionally, a number of difficulties are also seen to be connected to the professional, communal, and personal life contexts, requiring exploration of situational mathematic contents (Ginsburg et al., 2006). In relation to the context of the problem of numbers, Neill (2001) described that the problem has a close relationship with the general real-life situation, such as in banking, sales, shopping, and so forth. Consequently, mathematics learning can adopt inter curriculum context by using examples from other courses, such as science, technology, social science, English language, arts, and health.

This far, there has been no study investigating the originality and non-originality problem seeking in the problem of numbers. Meanwhile, a previous study carried out by Abdulla et al. (2018) reported a robust correlation between problem-seeking and creativity. Alabbasi et al. (2021) examined different problem-seeking, divergent thinking, and evaluative thinking between gifted and nongifted students. Further, Rubenstein et al. (2021) also operationalized the problem-seeking process and illustrated the learning method that enhances students' problem-seeking skills. Thus, this study is essential as it illustrates the originality and non-originality problems seeking by college students.

LITERATURE REVIEW

Originality is equal to novelty and differentness (Simonton, 2016). A distinctive and relatively new thought is referred to as an original idea (Moldovan et al., 2011). Linearly, Acar et al. (2017) referred to originality as the rare, unique, uncommon, scarce, and new element. Originality is determined by the level of difference between an idea compared to other ideas (Dumas & Dunbar, 2014). The measurement of originality can be carried out through an algorithm detecting participants who proposed distinct ideas

(Fortes & Andrade, 2019). Besides, Prabha (2017) has also indicated that originality can be observed from an uncommon and more profound response. However, merely different, new, and unusual ideas do not always represent originality, as original ideas also should present high utility value and suitability with the problem context (Runco & Jaeger, 2012). Therefore, originality can be identified from different ideas with high usefulness and suitability in the context.

In a number of literary works, problem-finding is commonly used to refer to problem-seeking in the educational field (Davis et al., 2017). Accordingly, in this study, we used both problem-seeking and problem-finding terms as the reference. Problem-seeking indicates the series of processes before problem-solving (Dillon, 1982). Problem-seeking is also popular as the first stage of the creative problem-solving process (van Hooijdonk et al., 2020). Rubenstein et al. (2021) described that creative problem-solving is an exclusive problem-solving process that requires (a) uncertain problem contextualization embedded within the social context, (b) involvement in the idea selection, and (c) construction of a new solution. Problem-seeking is the most crucial component of problem-solving since it utilizes thinking skills, the ability to start, and problem formulation skills to solve unstructured problems (Lee & Cho, 2007). Kozbelt et al. (2010) construed that problem-solving subsisted on problem identification, problem construction, and problem definition. From the aforementioned definitions, there are a number of skills that emerged during problem seeking, namely problem identification, problem definition, and problem construction. Meanwhile, in a different term, a previous study reported that problem-seeking should involve problem identification, clarify unstructured problems, and determine the problem parameters (Reiter-Palmon & Robinson, 2009). In short, problem-seeking represents the ability to identify the required information for solving the problem and problem boundaries for constructing suitable identification from students' own perspectives. This study describes the differences between students' problems seeking to find originality. Further, the general problem-seeking results were classified as non-original problem-seeking.

METHOD

This study aimed to describe the college students' originality and non-originality problem-seeking in solving problems of numbers. This study used the case study design, as defined by Creswell (2012), that a case can be from a single individual, a number of separated individuals or in a group, a program, an event, or an activity. The students' originality and non-originality problem seeking in completing the numeration problems were observed from their capacity to identify the required information and scope of problems to generate the suitable identification for the problems through students' viewpoint. Meanwhile, their originality problem solving was described following the unique, uncommon, and rare features of their ideas.

This study was carried out in the Mathematics Study Program of Universitas Muhammadiyah Jember, Indonesia. For the respondents, we involved the students presenting originality (coded as O) and non-originality problem-seeking (coded as N). The data collection process was started by providing problems of numbers to the students. Further, the student's results in solving the problems were analyzed to find their originality and non-originality problem-seeking. Then, we confirmed students' originality and non-originality problem-seeking through the interview process.

In addition, we analyzed the data through a series of processes. First, the data collection was carried out during the research by giving problems of numbers, as well as documentation and interview. Second, we conducted data reduction after we garnered a sufficient amount of data. In the data reduction, we transformed the students' results, as well as the documentation and interview results, into different formats. Third, we processed the data into written form with a clear theme flow in the data display stage. Fourth, in the conclusion stage, we described our findings following our research questions, consisting of the aspects, components, factors, and dimensions of the research phenomena, as well as drawing a conclusion from those findings.

RESULT AND DISCUSSION

This study was started by providing numeration issues toward 58 students from Universitas Muhammadiyah Jember, Indonesia, consisting of 44 female and 14 male students. The problem of numeration is presented in the following.

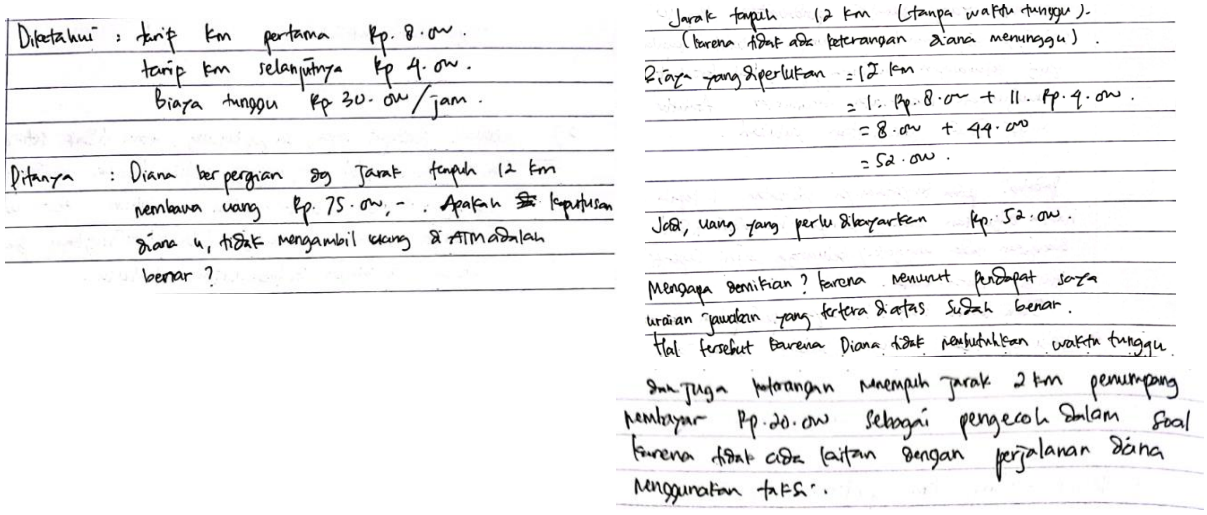
> "The taxi fee for the first kilometer is Rp.8.000/km, while for the next kilometers, it is Rp 4.000/km. The waiting time fee is Rp. 30.000/hour. For a less than 2 kilometers distance, a customer has to pay Rp20.000. Diana is going to take a taxi for a 12 km distance, and she has Rp.75.000. According to her, she does not need to go to the ATM as she assumed that her money is sufficient to take her to the destination. Do you agree with Diana? Please explain your answer."

Our obtained results showed that two students presented originality problem seeking, while the remaining 56 students had non-originality problem seeking.

Non-Originality Problem Seeking

As many as 56 students showed non-originality problem seeking by explaining that Diana needs only to spend Rp. 52.000 to get to her destination, so she should not go to the ATM machine. Their scope of problems is limited to the clearly presented issues by not estimating the waiting time. Besides, the students with non-originality problem-seeking also provided no meaningful rationale.

FIGURE 1
NON-ORIGINALITY PROBLEM SEEKING FROM N



In addition, one female student (coded as N) explained that the utterance of waiting time on the numeration problem serves as a deceiver. As illustrated in Figure 1, N mentioned that the question item does not say that Diana will be waiting for the taxi.

Originality Problem Seeking

Our obtained data suggested that two male students (coded as O1 and O2) have originality problems seeking observed from their different answers and logical explanation. The first student (O1) determined the scope of the problems by involving the time, distance, and speed, as illustrated in Figure 2.

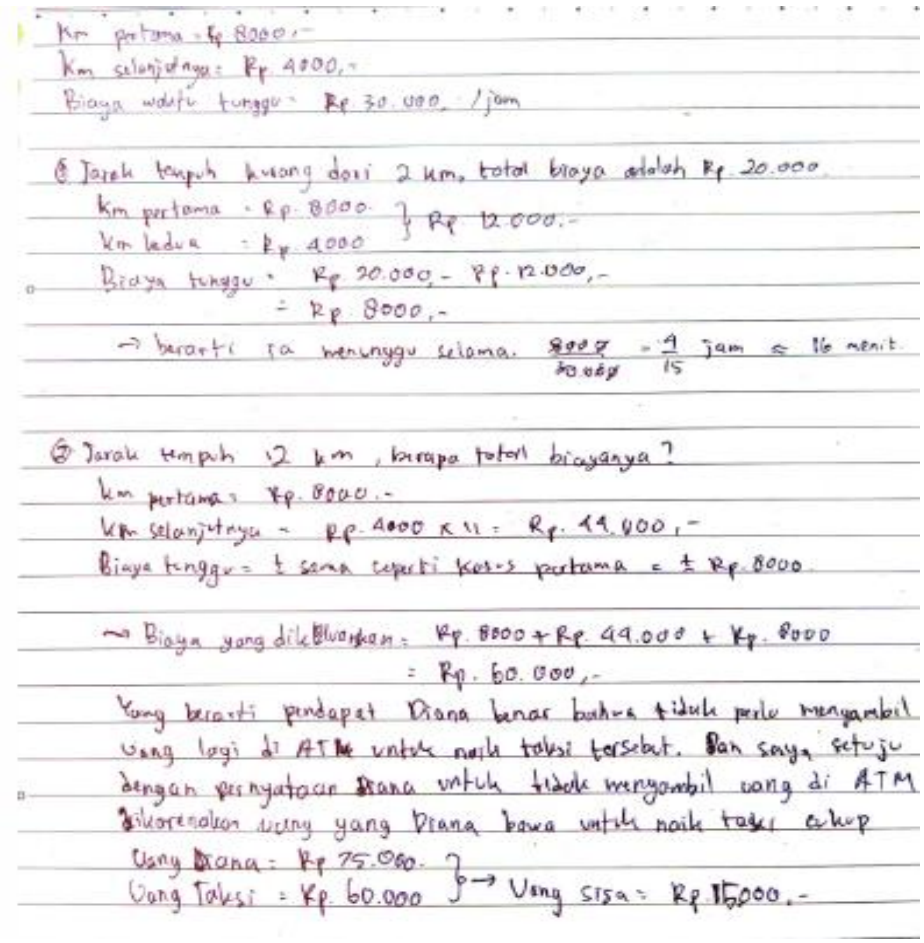
FIGURE 2
ORIGINALITY PROBLEM SEEKING FROM O1

As presented in Figure 2, O1 identified the problem scope by first identifying the speed of the taxi using his experience. His analysis result showed that in the city, the maximum speed of a taxi is 40km/hour. According to his calculation, Diana needs 0.3 hours to get to her destination. Then, the required fee, according to O1, was Rp. 52.000, based on the 12 km distance and one-hour waiting fee of Rp. 30.000. Besides, O1 added that even though 0.3 hours was less than one hour, it should be estimated as one hour, so Diana was charged the additional fee of Rp. 30.000. O1 also added that, in his experience, the taxi fee presented on the taxi screen continuously changing in every minute, so Diana had to pay an additional fee of Rp. 30.000.

Meanwhile, O2 identified the scope of the problem from the waiting time calculation even if it is not questioned in the item.

Figure 3 presents that O2's problem identification results in Rp. 8000 waiting fees, obtained from less than a 2 km fare difference (Rp. 20,000) and the first 2 km fee of Rp. 12,000. According to O2, the waiting fee was calculated from the waiting time until Diana got into the taxi. Besides, there was also a fee difference between the less than 2 km distance and the first 2 km fee, so O2 placed the fee difference as the waiting fee. Therefore, the total fee, including the waiting fee, that should be paid by Diana was Rp. 60.000. The result obtained by O2 represents his viewpoint without experience factors, as he has never taken a taxi.

FIGURE 3
ORIGINALITY PROBLEM SEEKING FROM O2



Our data analysis results suggested N, who had the non-originality problem seeking, stated that Diana did not need a waiting fee as the fee only served as a deceiver. Interestingly, our data showed that non-originality problem-seeking is experienced by female students. This finding is contrary to the conclusion reported by Alabbasi et al. (2021), showing that originality problem-seeking tended to be experienced by females compared to male students. The same nuance was also conveyed in the study from Ülger & Morsünbül (2016) that the higher originality score was more commonly observed in female students than in male students. Meanwhile, for the male students, we identified different answers showing originality problem seeking. Their difference was in the adoption of their experience. O1 showed originality problem-seeking using his experience taking a cab, while O2 also presented originality problem-seeking without utilizing his experience. O2 formulated his originality problem seeking from his analysis. Linearly, Kang & Kim (2012) stated that the results of problem-seeking are highly influenced by students' experience and non-permanent solutions, as well as their experience related to the provided issues. Besides, problem-solving is also regarded as a stage of comprehending a problem by using personal experience (Kozbelt et al., 2010; Davis et al., 2017). Further, Lee & Cho (2007) also described that problem-seeking is influenced by students' experiences in identifying a problem.

CONCLUSION

All of the students showing non-originality problem seeking used limited scope of the problem, following what is merely asked in the question, without involving the waiting time as they perceived the waiting time as a deceiver. There were two students with originality problem-solving with logical explanations. However, they presented different answers. The first students used the scope of the problem involving the time, distance of the destination, and speed of the taxi. His problem identification was initiated by identifying the speed using his analysis and experience. Meanwhile, the second student's scope of problem included the calculation of waiting time, even though the question did not explicitly mention the need to calculate the waiting time. The result from O2 represented his perspective toward the issues without using his experience since he admitted that he never took a taxi. Our research results are expected to enhance the knowledge of the importance of problem-seeking in problem-solving for numeration problems since it facilitates excellent identification and definition of problems related to numbers. Additionally, the student's originality and problem-seeking tendency also facilitate teachers in formulating more efficient teaching processes and improving students' problem-seeking skills.

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