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Exploring What Teacher's Decision-Making in Designing Mathematical Assignments?: Case Studies in Beginner

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ABSTRACT

Objective: This research uses the M-Four theory to investigate how teachers design mathematical tasks based on contextual problems. **Method:** The research involves a case study approach, utilizing in-depth observations, interviews, and Mathematical Task Design Sheets (MTDS) for data collection. This study involved one Beginner Teacher (BT) (age 35) participating who was selected based on teacher experiences. Through observation results, a BT who consistently assigns contextual math problems is selected for further analysis. **Results**: The study's findings reveal that BT tends to produce contextual assignments that primarily focus on the context presented in the textbook, with minimal additions or adjustments based on real-life situations experienced by students. This research contributes to the existing literature on problem-based learning and task design by examining the perspectives of BT. It provides insights for teacher professional development programs and curriculum design. **Novelty:** The novelty of this research lies in its exploration of how BT designs mathematical tasks based on contextual problems using the M-Four theory.

INTRODUCTION

Assignments are essential in learning. A person's understanding of mathematics is closely related to his ability to generate and ask questions through assignments. Furthermore, assignments are also central to learning mathematics (Sullivan et al., 2012). Most teacher planning focuses on making assignments, and interactive teaching focuses on smoothly implementing tasks according to plan. Mathematical assignments affect students when learning in class, so teachers should choose meaningful mathematical assignments for students (Antonijević, 2016; Martin et al., 2015).

For this reason, teachers need to develop skills in designing mathematical assignments. Some literature reveals that designing assignments is an essential skill that mathematics teachers need to develop, for instance, analyzing the difficulty level of questions, representing real situations to mathematical problems, and developing mathematical contextual problems (Breen & O'Shea, 2021; Jones & Pepin, 2016; Lee, 2017). Lee (2017) confirmed that designing math assignments is one way to develop teaching skills. However, designing or modifying assignments is an obstacle for some teachers in learning. Inadequate teacher content knowledge and experience in designing assignments or modifying assignments (Breen & O'Shea, 2021) will impact student development if the assignments only focus on students' math books.

Tasks designed can be based on the demands and goals of the teacher for understanding and developing strategies, procedural skills, and thinking skills. This case is by the demands of the 2013 Curriculum expecting math teachers to present assignments in the form of problems. The problem is used as a starting point in learning so that students are accustomed to developing their thinking skills. Problems are

situations or questions that do not have an immediate solution and require thought and challenges to overcome (Sa'dijah et al., 2017). It is confirmed that the Reform in mathematics education aims to make marked changes in the types of classroom assignments (NCTM, 2022).

Several researchers studied BT in various ways. A study of successful teachers selecting and preparing the types of math assignments that resulted in high student learning outcomes. The tasks that are structured and determined by the teacher in the classroom greatly influence the types of thinking processes in which students are involved, and this, in turn, will influence student learning outcomes. However, sometimes the assignments can limit or broaden students' views on learning. Given that students have different backgrounds and abilities. Furthermore, the ways of BT and expert teachers (experience) mentally represent learning problems, assessment, and curriculum planning. The research findings show that expert teachers highlight deep features to form a representation of a problem situation, while BT tends to base them on surface structures (Sainuddin et al., 2022).

Contextual tasks are tasks that are known and close to the real everyday life of students. Contextual problems are problems that present an authentic environment for students. Contextual tasks can be used as a starting point for learning mathematics in helping students develop meaning to the mathematical concepts being studied. They can also be used as a source of mathematical applications. The teacher must be well acquainted with the student's "contextual condition" environment to make contextual assignments. Context is a situation that attracts students and for them to recognize theory. Furthermore, the Program for International Student Assessment (PISA) context is interpreted as a situation depicted in a problem. Four contexts are the focus: personal context, educational and occupational context, social context, and scientific context. As stated in the 2012 PISA work area, there are five kinds of context or situational problems: (1) student personal context, namely, situations related to students' daily lives at home with families with playmates, classmates, and their fun. (2) school or academic context, namely situations related to academic life at school, in the classroom, and activities related to the learning process. (3) work context is a situation related to the work environment. (4) the social context, namely situations related to the life and activities of the surrounding community where the student lives. (5) the context of science, namely situations related to phenomena and substances scientifically. Furthermore, Jao & McDougall (2015) defines that in mathematics assignments, it is necessary to pay attention to the following: 1) Is part of a real-world problem, 2) Allows having several solutions, 3) Provides opportunities for students to develop many solutions and strategies, 4) involving various representations, 5) Students express mathematical ideas, 6) Expecting students to communicate their reasoning, and 7) Reflecting as a continuous process.

Designing math tasks is closely related to the decision-making process. Therefore, learning that trains decision-making skills should encourage students to review various points of view. Every teaching act results from a decision. This case is because a teacher uses several different options in learning and needs to choose between these options, which option they think is most suitable for learning goals (Guangul et al., 2020; Joshi et al., 2020; Lepp et al., 2021; Purwanto et al., 2020). Decision-making is choosing a preferred option or action among a set of alternatives based on given criteria or strategy. The decision-making process is a series of stages or sequential events such as identifying problems, setting goals for solving, making initial decisions, developing and

evaluating alternatives, and selecting one of the alternatives, which are then implemented and followed up. Individual characteristics, knowledge, beliefs, and experience can influence a person making decisions. Furthermore, to consider what criteria should be taught in their decision-making based on consideration of student development, context, and content (subject matter).

From the decision-making stages presented by figures who study decision-making, there are similarities in the indicators for the components of the decision-making stages, so the construction results of the decision-making process are obtained, which will be used in this study, including identifying problems, gathering information, determining solutions, and evaluating or by term M-Four. Several researchers have studied the study of teacher decision-making in mathematics learning—teachers' decision-making in Italy and New Zealand in presenting mathematics lessons. Griffith & Groulx (2014) looked at the beliefs and practices of mathematics teachers in the classroom as they relate to instructional decision-making. Kosko (2016) looked at decision-making about mathematics assignments by prospective teachers and mathematics teachers. Dede (2013) explored the values underlying decision-making processes in study groups for mathematics teachers in Turkey and Germany. A theory is that in making decisions, a person enters a specific context based on resources, goals, and orientation. Stahnke et al. (2016) examined teacher decision-making from a cognitive and site perspective. Van-Lommel et al. (2017) explored how teachers use data and intuition in the decision-making process regarding classroom retention. Santagata & Yeh (2016) found that the teacher community also plays a vital role in teacher decision-making.

Based on the results of previous research, much research on teacher decision-making has been carried out. However, recent research findings still need to focus on assignment design. Accordingly, the research novelty describes the task design process from the viewpoint of beginner teachers. We use novice teachers as a reference for this research based on cases in the learning process in class. This research mainly provides insight to beginner teachers in making decisions to design mathematics assignments. In addition, this research provides recommendations for curriculum development in the school environment.

RESEARCH METHOD

We will first discuss the research context or the study's current state. We discussed the participants, task designs, data collection procedures, and data analysis. The exploratory study focuses on the beginner teacher's decision-making in design assignments.

Context of the study

This research is qualitative research with a case study approach. Qualitative research with a case study approach referred to in this research is directed to provide an overview of the teacher's decision-making profile in designing mathematical assignments based on teaching experience in natural conditions. The selection of research subjects will use purposive sampling of the maximum variation type based on specific considerations to find a small sample with significant variations to obtain basic patterns.

Participants

The study recruited BT from a variety of schools. Their age is 35 years. The BT had 45 minutes to complete the design assignments. Researchers contacted our colleagues at numerous schools to ensure that their BT completed the assigned task. BT, who participated in the study, was enrolled in advanced schools. As a result, we chose one BT to explain the design assignments. The BT is a junior high school teacher in the Middle Area of Indonesian with criteria 1) available positions for young teachers, 2) qualified bachelor in mathematics education, 3) has minimal teaching experience of three years at the level, 4) has excellent and qualified communication skills, and 5) ready to participate in research. After making observations and the results of portfolio analysis, the BT was obtained with each functional position level for young and middle teachers. In the initial observation, the researcher observed the BT suspected of carrying out the mathematics task design. During the observation, the researcher found exciting things in the assignments designed by BT.

The instrument for collecting data

A questionnaire and an interview protocol were used to collect data. Three tasks were included in the questionnaire, each of which contains references to the design assignment. Table 1 is the assignment and descriptions.

Table 1. The assignment design.

Tasks	Descriptions
Please make at least two different contextual math problems and solve them simultaneously related to comparing value and return of value.	Researchers stimulate teachers in making decisions to design contextual tasks related to comparisons of values and different values.
Pay attention to the problems you have created. Is there a solution that is more than one correct way? If there is, show a different way of solving the problem! If not, create another math problem that has more than one solution.	Researchers encourage teachers to develop diverse perspectives in determining solutions to the problems that have been designed.
Make a contextual math problem different from the one you made before. The problem combines certain concepts or algorithms that students have learned. The problem can also use tables, images, or other data. Make it at once with the solution.	The task stimulates the teacher to develop assignments that involve multiple representations. In a sense, the complexity of the questions designed by the teacher becomes the determining factor of this task.

Researchers formulated the task with some considerations. We interviewed BT, who provided an interesting response to the questionnaire. We showed their original solutions during the interview. They were tasked with providing detailed justifications for the concepts they wrote. The interview lasted approximately 10-15 minutes and was recorded and transcribed using an audio recorder. The main instrument, namely the researcher and auxiliary instruments, consist of a Mathematical Task Design Sheet (MTDS) and an interview guide. MTDS is structured to direct teachers to produce mathematical assignments that have been designed in such a way.

Data Analysis

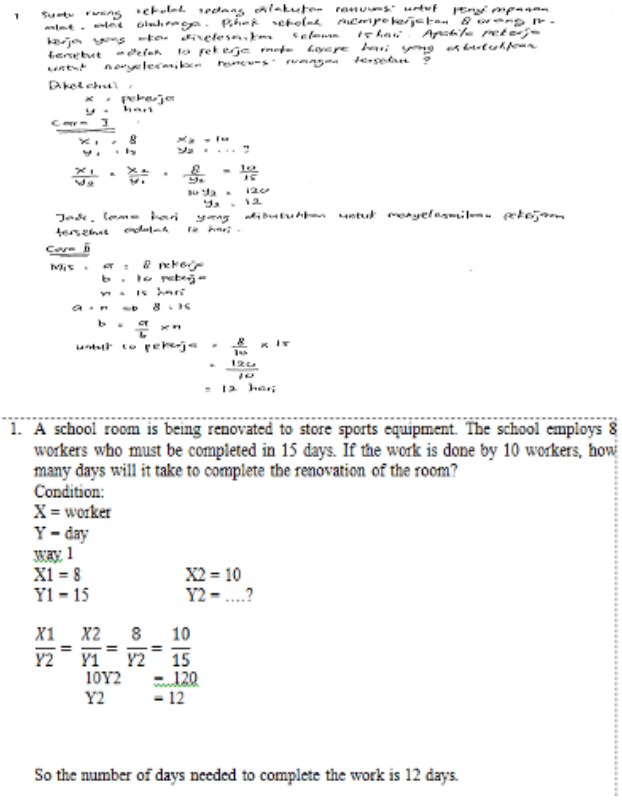
We analyzed the data using thematic analysis. It deduces patterns (themes) from respondents' responses using the instruments. We chose this method for a variety of reasons. Firstly, there is no prior framework for examining the decision-making of BT, which could serve as a contribution to this study. Secondly, the method is adaptable and could be used to address the research question, specifically regarding the meaning of decision-making when designing assignments.

This study discovered patterns and unique naming using the thematic analysis method. The contribution of this study is significant through thematic analysis, as studies utilizing the method in mathematics education are still uncommon. We wrote the final reports of our research results. Besides, this study carried out data triangulation to enhance the objectivity of our findings. This study improved trustworthiness by discussing our research results with experts in mathematics education to achieve mutual agreements. This study ensured that the data obtained was accurate and complete by administering the task in written form and transcribing every interview immediately after recording it. There was also a validation of the coding process and recoding of different categories through discussion with several mathematics education experts.

RESULTS AND DISCUSSION

Results

This research includes four stages BT goes through in designing or designing mathematical assignments. The four stages, known as the M-Four, include identifying problems, gathering information, determining solutions, and evaluating. The researcher assigned the BT to make a mathematical problem based on the MTDS. The questions made by BT are presented in Figure 1 to Figure 3.



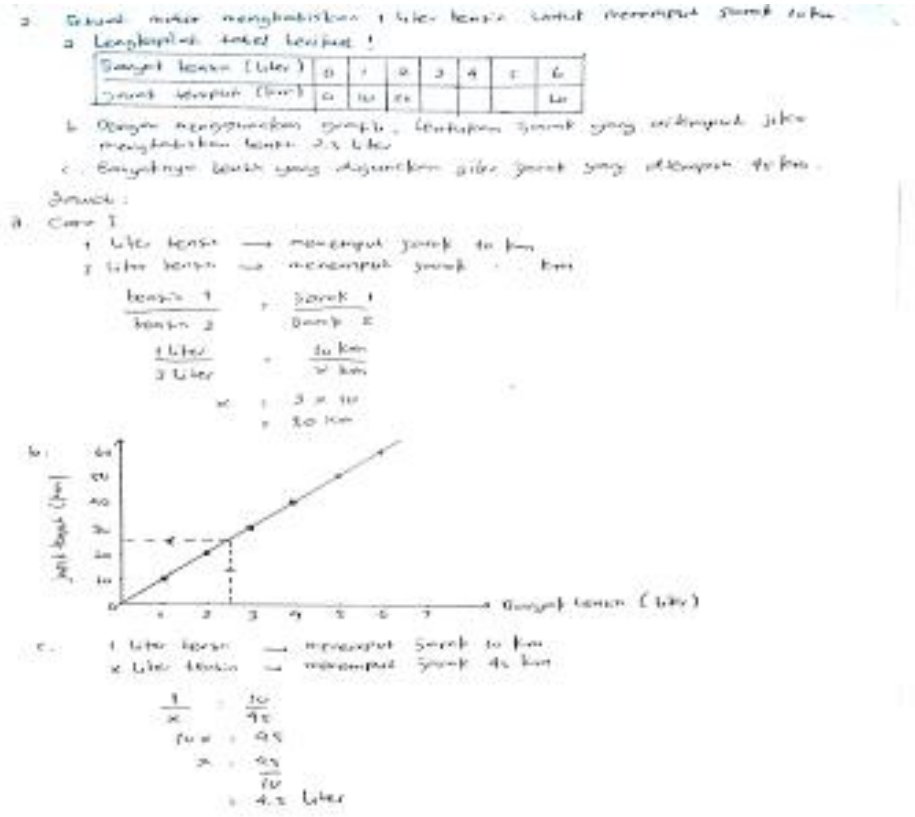
1. A school room is being renovated to store sports equipment. The school employs 8 workers who must be completed in 15 days. If the work is done by 10 workers, how many days will it take to complete the renovation of the room?

Condition:
X = worker
Y = day
way 1
X1 = 8 X2 = 10
Y1 = 15 Y2 = ...?

$$\frac{X1}{Y2} = \frac{X2}{Y1} = \frac{8}{Y2} = \frac{10}{15}$$
$$10Y2 = 120$$
$$Y2 = 12$$

So the number of days needed to complete the work is 12 days.

Figure 1. Problems designed by BT based on MTDS for question 1.



2. Iqra rides a motorbike from home to school by spending 1 liter of gasoline for a distance of 10 km.
a. Complete the following table!

A lot of gasoline (liters)	0	1	2	3	4	5	6
Mileage (km)	0	10	20				60

b. Using the graph, determine the distance traveled by the pledge if you spend 2.5 liters of gasoline
c. The amount of gasoline used by Iqra if he travels 45 km.

Answer:

a. solution 1
1 liter of petrol ➔ travel 10 km
3 liters of petrol ➔ traveled ..... km

$$\frac{\text{gasoline 1}}{\text{gasoline 2}} = \frac{\text{distance 1}}{\text{distance 2}}$$

$$\frac{1 \text{ liter}}{3 \text{ liter}} = \frac{10 \text{ km}}{1 \text{km}}$$

x = 3 x 10
= 30 km

c. 1 liter of petrol ➔ travel 10 km
3 liters of petrol ➔ traveled 45 km

$$\frac{1}{x} = \frac{10}{45}$$

$$10x = \frac{45}{10}$$

x = 4,5 liter

b.

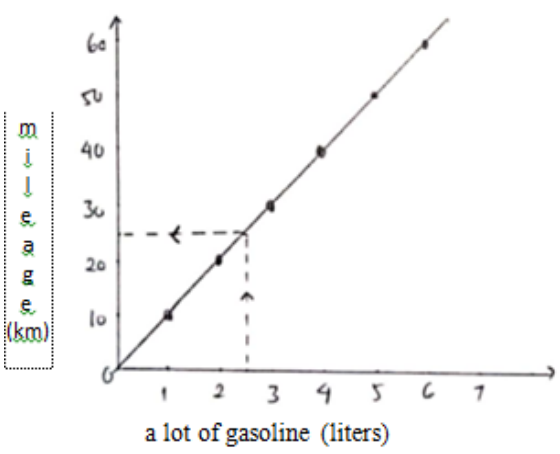
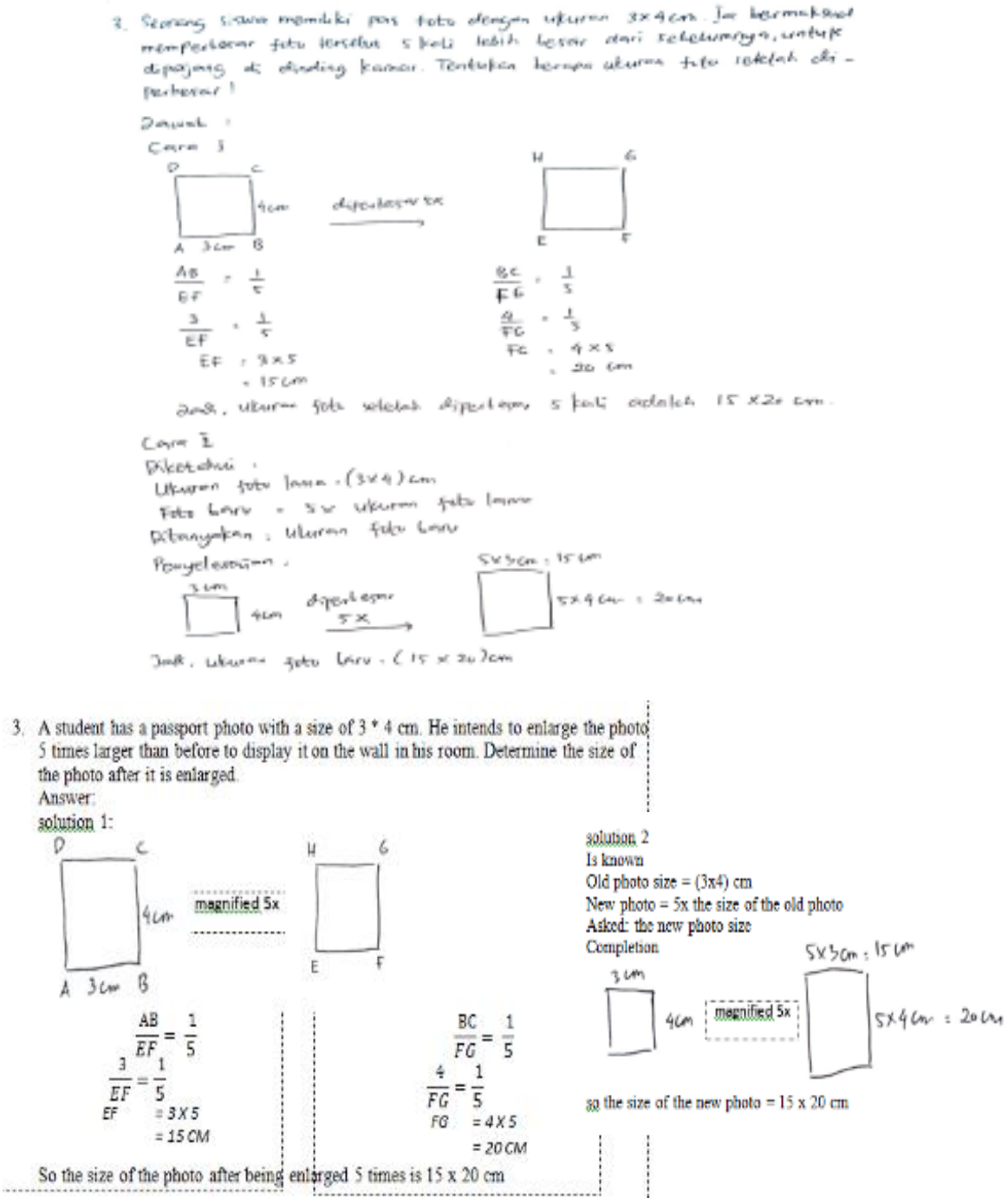


Figure 2. Problems designed by BT based on MTDS for question 2.



3. A student has a passport photo with a size of 3 * 4 cm. He intends to enlarge the photo 5 times larger than before to display it on the wall in his room. Determine the size of the photo after it is enlarged.
Answer:
solution 1:

$\frac{AB}{EF} = \frac{1}{5}$

$\frac{3}{EF} = \frac{1}{5}$

$EF = 3 \times 5 = 15\ CM$

$\frac{BC}{FG} = \frac{1}{5}$

$\frac{4}{FG} = \frac{1}{5}$

$FG = 4 \times 5 = 20\ CM$

So the size of the photo after being enlarged 5 times is 15 x 20 cm

solution 2
Is known
Old photo size = (3x4) cm
New photo = 5x the size of the old photo
Asked: the new photo size
Completion

5x3cm = 15cm
3 cm
4cm
magnified 5x
5x4cm = 20cm

so the size of the new photo = 15 x 20 cm

Figure 3. Problems designed by BT based on MTDS for question 3.

Discussion

Phase Identify the problem

BT tries to understand problem situations by marking information by making contextual math problems by considering contextual situations that are close to students, student abilities, material selection, paying attention to the difficulty level of questions, and adjusting the learning objectives to be achieved in the lesson plan that has been made.

It can also be seen that BT expresses ideas by modifying the assignments in the book as material for designing questions. However, it requires the teacher to assess and modify assignments by adding objects or information to the problems given for student

learning purposes (Firoozi et al., 2019; Neuwirth et al., 2021; Reynders et al., 2020; Silalahi & Hutauruk, 2020). Furthermore, BT brings into contexts that students and those around them easily understand. BT does this case to give students an understanding of mathematical concepts while presenting an authentic environment for students. This case is in line with the interview excerpts in Table 2.

Table 2. Interview excerpts 1.

R	Tell me, how did you make this problem?
BT	Because this task is related to contextual mathematics problems, I need information about a situation close to the student. What is the student's initial knowledge? Then think about something else.
R	Do you mean to think of something else?
BT	Like thinking about the difficulty level of the questions and the material, we adjust it to the lesson plan we have made.
R	You said earlier by the RPP! Can you explain?
BT	Of course, in making questions, we must be based on what competencies we will achieve. As in the questions I made, the competency to be achieved is that students can distinguish between value and reverse value.
R	What about the difficulty level of the questions?
BT	We also adjust the level of difficulty. If our learning objectives want students to understand, yes, we adjust the difficulty level but wait to give difficult questions.
R	Why did you choose value comparison material and reverse value?
BT	Because students still need help distinguishing which questions are about comparisons of value and which are about comparisons of turning values. The point is that they still need help with this material.
R	Are the questions you are making the same as those in textbooks or on the internet?
BT	The questions I made were adopted from the textbook. However, with a slight modification of the questions by bringing them into a context easily understood by students and those around them.

Based on Table 2, it can be concluded that in identifying problems, BT seeks to mark essential ideas from problem situations by considering context, student abilities, material, the difficulty level of questions, and learning objectives. It is modifying the assignments in the book as a reference in making more than one way of solving assignments.

Gathering Information

Judging from the tasks designed in Figure 1, BT designs assignments based on the context around students involving the daily context of students, the school environment, and the environment where they live. In a sense, BT tries to lead or direct students' thinking by designing real problem situations for students (Alsaleh, 2020; Prince et al., 2020; Wendell et al., 2019). In building BT questions using the context of building renovations, motorized vehicles, and photos. This case is an early indication of BT to design problems. Constructing BT questions seeks to dig up information related to the context used in the questions to obtain problems appropriate to the material. This condition shows that BT has some information obtained from the school environment, students' daily habits, and the environment around students that can be used in making questions. Furthermore, BT also obtained information from various aspects such as books and the internet. Thus, BT collects information from various aspects and has more than one piece of information needed in designing tasks.

BT tried to design the first problem according to the context of the school environment, where BT took the context of school renovation with the problem of the number of workers, the time to work, the materials used, the tools used, the price of goods, the salaries of workers. Furthermore, BT connects problem situations, namely the relationship between the number of workers and the time needed to complete a job. Next, the BT tries to design the second problem according to the student's daily life, where the BT takes the context of motorized vehicles with problems using fuel, types of vehicles such as bumps or motorbikes, scooters, distance, speed, and time. Furthermore, BT connects the problem with the relationship between fuel use and mileage.

Furthermore, BT tries to design the third problem according to students' daily lives, where BT takes the context of photos with the problem of image quality (pixels) and photo size. Furthermore, BT connects problem situations to the relationship between the size of the photo to be enlarged. Then BT compares the problems with those in books and the internet by making contextual modifications or adjustments. The activities carried out by BTs in comparing existing ideas with the problems faced by directing their attention to certain aspects of content and determining how to process information. The tasks created can show the interaction between students, teachers, environment, and resources. This condition is in line with the interview excerpts in Table 3.

Table 3. Interview excerpts 2.

R	What context do you use in this problem?
BT	The context of building renovation, the context of motorized vehicles, the context of photos
R	What were your considerations in choosing this context?
BT	The contest is in the school environment, student habits, and based on the environment where students live. Besides that, it attracts students' attention to learn about the use of mathematics around them.
R	Is there any other information you can think of other than these three contexts?
BT	There are, such as food vendors in canteens, sales of stationery or books at copiers, bumps, public transportation, or bicycles.
R	What information did you get from the context you used in the question?
BT	In the context of building renovations, namely the number of workers, processing time, materials used, tools used, the price of goods, and wages. For motorized vehicles, such as fuel use, type of vehicle such as an impactor or motorbike, distance, speed, and time. Meanwhile, for the context of the photo, it is like a photo, type of camera, image quality, photo size 3x4, 2x3, which is like that.
R	Why do you link the number of workers with the time it takes?
BT	So in this renovation, the school hired builders to do it. Then the room must be done as soon as possible. This situation is still common for students so they can understand the meaning of the problem
R	Why do you link the mileage with the fuel used?
BT	the problem of using fuel and mileage often arises in this material, especially in basic competence. In this material, we want to see students' ability to distinguish between equal and reverse value comparisons, like the questions I made.
R	Why did you end up choosing a photo size for this problem?
BT	Regarding size, it means that there is a relationship with mathematics, so I am more inclined to choose the size of the photo.
R	Why do you prefer eight workers can be completed in 15 days if ten workers can be

	completed in how many days?
BT	Why do I use the number 8 for workers? Eight people are working on the renovation of the room. I have calculated other values, and there are no difficulties. I also want the results later to be non-decimal.

From the excerpts of the interview in Table 3, the BT collects information by comparing his ideas with the results of previous experiences adapted to the problem situation. Next, the BT coordinates the problem situation with the results of his experience. This strategy makes it easier for BT to design questions.

Define Solutions

Based on Figure 1, BT chooses three problems: the first is related to comparing inverse values, the second is related to comparing values, and the third problem is related to value comparisons. BT raises issues using contexts related to students' daily habits, the school environment, and the environment around students.

BT had many ideas in designing the first problem by linking the renovation of the building, the number of items needed and the price, the number of workers, and the salary. This condition shows that BT seeks to build information based on quantities easily understood by students, so for the first problem, BT raises the problem of the ratio of inverse values to the quantities used, namely the number of workers and length of work (Agustyaningrum et al., 2020; Fitriana et al., 2022; Sinaga et al., 2023; Tong et al., 2020; Wang et al., 2022). Furthermore, BT provides another alternative by utilizing a known quantity. In this case, BT states that multiplying 8 x 15 divides the result by ten workers. This case is in line with the interview excerpt in Table 4.

Table 4. Interview excerpts 3.

R	What context do you use in this problem?
BT	Building renovation context
R	What are your considerations in choosing the context of building renovation?
BT	the context is in the school environment. Besides that, it is to attract students' attention to learn about the use of mathematics around them.
R	From the context of building renovation, what information did you get?
BT	The number of workers, processing time, materials used, tools used, price of goods, and workers' salary.
R	Why do you link the number of workers with the time it takes?
BT	So in this renovation, the school hired builders to do it. Then the room must be done as soon as possible. This situation is still common for students so they can understand the meaning of the problem.
R	Can your problem be solved?
BT	You can use the inverse ratio formula with the equation $x1/y1 = x2/y2$, where x is the worker and y is the number of days.
R	Does your problem have more than one solution?
BT	Yes, apart from using the reverse value comparison formula, we multiply the second method by 8 x 15 and divide the result by ten workers.

Furthermore, BT raised the theme of using fuel with mileage. This problem was inspired by distance and speed problems, so BT developed it by linking travel time with distance. In this case, BT tries to stimulate students to think about the fuel needed to get to school by considering the selection of numbers in the questions. Furthermore, for strategy selection, BT predicts that these questions will encourage students to solve

using graphical, tabular, or procedural methods. Furthermore, BT provides another alternative by utilizing a known quantity. In this case, BT states that by using tables and using graphics. This case can be seen in the Interview Excerpts in Table 5.

Table 5. Interview excerpts 4.

BT	Motor vehicle context
R	What were your considerations in choosing the context of a motorized vehicle?
BT	So, I want them to know how much fuel they use to get to school or how much fuel it takes to cover a certain distance.
R	From that context, what information did you get?
BT	Fuel usage, type of vehicles such as a bump or Matic motorbike, scooter, distance, speed, and time
R	Why do you link the mileage with the fuel used?
BT	For the context of motorized vehicles, it is most suitable to make questions related to fuel and mileage with material comparisons of equivalent and reversed values.
R	Can your problem be solved?
BT	Yes, you can. It is obtained from the petrol 1/gasoline 2 equation = distance 1/distance 2
R	Does your problem have more than one solution?
BT	It can be done by calculating a comparison worth using tables and graphs.
R	In your question, use the order of gasoline 1-6. Why do you do that?
BT	I use small numbers to make it easier for them to count; this is sequential in value, meaning there will be a pattern later.
R	Why do you think like that?
BT	This question is relatively easy. Like my initial goal, how do students understand the concept or characteristics of this material? However, they also want to see how they respond when they find results ranging from 1 to 3. Will they continue their search using the comparison formula for that value or immediately assign
R	How about the 2.5-liter one?
BT	So I purposely used the number 2.5 liters. If later students find a pattern, they will feel bored, so I do that.
R	Why did you show/select 45 km mileage in part c?
BT	To give the impression that the way to work is different even though what is known here is the mileage.
R	Why did you make the questions in the form of tables and graphs?
BT	presents questions that are different from usual and adjust to essential competencies.

Furthermore, BT raises concerns about the problem of comparison of values. In this case, BT raised the problem of students' daily habits, namely the photo problem. The BT explained alternative solutions to the problem by underlining the core of the problem, namely the size of the photo being enlarged five times larger than the previous size. Furthermore, the BT explained the reasons for choosing a strategy by encouraging students to dig up their initial knowledge regarding comparative material. Furthermore, BT provides another alternative by utilizing a known quantity. In this case, BT stated that multiplying the photo size from 3x4 with the size to be enlarged is 5. This condition is by the interview excerpt in Table 6.

Table 6. Interview excerpts 5.

R	What context did you use in the problem?
BT	Context about photos
R	What were your considerations in choosing this context?

BT	I want to give an enlarged/concrete photo problem. Moreover, this is often seen and done by students nowadays.
R	From that context, what information did you get?
BT	Photo, type of cellphone, image quality, photo size 3x4, 2x3, like that.
R	Why did you finally choose the size of the photo for this problem?
BT	Regarding size, it means that there is a relationship with mathematics, so I am more inclined to choose the size of the photo.
R	Can your problem be solved?
BT	Yes, I can. The answer is obtained from the solution of an equation like this.
R	Does your problem have more than one solution?
BT	Yes, so you can use the equivalent comparison formula; we can also change the size of the photo from 3 * 4 to the size to be enlarged, which is 5
R	Why did you use 3*4 size for the passport photo?
BT	For a photo size of 3 * 4, it is the most common or frequently printed by the context or reality on the ground.
R	Why did you choose the size to be magnified five times in the problem?
BT	To suit the existing contest. 3x4 size, if enlarged five times, it is the same as 6R size, so it is very suitable if displayed in the room

BT also explained that choosing the numbers used in the questions according to the context and considering solutions makes it easier for students to do arithmetic so that they understand the concept of comparisons of value and value turning. In addition, the BT also considers the challenges of the questions so that students think more deeply about translating the sentences from the questions into mathematical form. In addition, BT designs tasks that generate various solutions to open-ended problems (Sa'dijah et al., 2017). This condition shows that teachers make decisions by considering various things to build ideas from the tasks to be designed.

Evaluate

BT re-checked the ideas or information obtained to determine whether the context of building renovations, motorized vehicles, and photos could be implemented in the material to compare value and value return. Furthermore, BT shows that it has some backup ideas or information to anticipate if the context used cannot be implemented. In addition, BT believes that the questions created can be solved because they provide sufficient information and have more than one way of solving them. BT checks all the questions designed and assesses the feasibility of the solutions generated from these questions. In this case, Longchamp (2017) stated that the evaluation is carried out holistically, where the teacher needs to ensure the fairness of the tasks designed and will be used by students in solving problems. This condition can be seen in the interview transcript in Table 7.

Table 7. Interview excerpts 6.

R	Earlier, you made a problem related to the context of renovating a motorized vehicle building and still taking photos. Is your chosen context implementable?
BT	Yes, because the context I choose provides information regarding the value I use, and the problem I raise can be implemented into the problem.
R	What about other context-related information that you collect? Can it be implemented too?
BT	Yes, it can be implemented for other contexts, so it is a matter of looking for more information to be implemented into the problem.
R	What would you do if each situation you mentioned earlier in the problem could not be

	implemented?
BT	This case means we can use the context I mentioned earlier or look back at the students' daily lives. Do we take it from their family environment, the community around them, for example, the distance from home to school, and do they use bicycles or motorbikes so we can use all of that in a matter of comparison?
R	Are you sure the question you made is correct? Why?
BT	Yes, I am sure. Because the questions provide enough information and I have calculated the answers well so that the results are not decimal, I avoid answers, for example, 10.2; students will be confused about how many days it will be if the answer is like this.
R	Have you anticipated the worst possibility of the question you made?
BT	Already, by checking again, starting from the data or information that is known whether it is complete or not, re-checking the editorial questions and answers whether these questions are appropriate for giving to students or not.

BT also explained that students in class often encountered questions 1 and 2, and question number 3 was categorized as non-routine. Questions designed by BT focus on contextual conflict problems and how students understand concrete problems from various types of cases, especially comparison problems. In addition, BT designed relatively new questions for students with different difficulty levels. This case means that the BT considers the difficulty level of the questions and the student's abilities. This case is in line with Carey et al. (2015) and Liu et al. (2016) that giving students a broader space to think allows students to build thinking and reasoning capacities by exploring answers according to the difficulty level of the questions and their abilities so that students are active in class. This case can be seen in the following interview transcript in Table 8.

Table 8. Interview excerpts 7.

R	Is the question you are making a new thing for students? Why?
BT	Questions 1 and 2 generally relate to the context I use in this material. However, question number 3, has a different level because this is something new for students by presenting the concept of congruence in comparing values and value comparisons.
R	Are you sure students will accept your assignment?
BT	Yes, because the assignments I make are in close context with students, both in the school environment, where they live, and in the community, I relate them to the material. We adjust the difficulty level of the questions to the learning objectives to be achieved and adapt them to the student's abilities.
R	Is the choice of context or situation important to students? Why?
BT	Yes, because before I make assignments, I need to know about situations suitable for students, meaning that students in their daily activities can encounter these situations.
R	What do you expect from the assignment made?
BT	Because this is contextual, I want them to be able to apply it. I want them to understand the concrete problems of various cases, especially in comparative cases. I also hope that students are creative and critical and able to find various solutions for logical reasons.
R	Is there a positive or negative impact from the assignment you made?
BT	The positive impact is that students know the concept of comparison itself and can translate question sentences into mathematical form and how to apply them to the real world.
R	Is the question that you made the best result of thinking? Why?
BT	Yes. First, the selection of the context that I use here is close to the students. I have calculated the skin level on the questions and the selection of grades. Second, even though

this question results from a modification, the purpose is clear: to provide students with an understanding of the material for comparing values and returns. The third is by presenting problems related to other concepts or materials.

In this case, the BT also pays attention to the issues raised by the contexts that students in everyday life commonly encounter; these problems are really by the concepts that will be conveyed; these problems consider the mental activity of students in translating these problems into the context of mathematics.

CONCLUSION

Fundamental Finding: BT conducts verbal analysis, considers various factors in task design, modifies assignments based on available textbooks, and poses problems by considering strategies and solutions. BT also designs assignments based on the context around students, involving daily context, school environment, and living environment, with multiple formations related to the mathematical concepts taught. Authentic contexts are selected for task design. **Implication:** The findings of this study emphasize the importance of providing support and professional development programs for BT to enhance their task design skills. Training and resources could focus on improving their ability to consider real-life situations experienced by students, using authentic contexts, and promoting open-ended problem-solving. By enhancing the task design skills of BT, it is expected that the quality of contextual assignments will improve, leading to enhanced student learning outcomes. **Limitation:** It is important to note that this study has limitations. The findings are based on a qualitative case study approach with a limited sample size of only one BT and senior teachers suspected of assigning contextual math problems. Therefore, the generalizability of the findings may be limited.

Further research with larger sample sizes and diverse contexts is needed to validate the findings. **Future Research:** Future research could investigate the impact of BT's designed assignments on student learning outcomes to better understand the effectiveness of these assignments. Additionally, further research could explore other contextual factors that influence task design, such as curriculum guidelines, cultural considerations, and the impact of technology on task design. Comparative studies between BT and experienced teachers could provide insights into differences in task design approaches and suggest effective strategies for designing contextual mathematical tasks. Further research in this area will contribute to the existing literature on problem-based learning and task design and inform teacher professional development programs and curriculum design to better support BT in designing practical contextual mathematical tasks.

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