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Learning Design in Translation Topic with Cinema Context for 9th Grade Students

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ABSTRACT
The use of real-world contexts in RME learning makes the concepts learned by students more meaningful. In this research, a cinema, which is relevant to students' lives are used as learning contexts. This research aims to develop a learning trajectory based on the RME approach using cinema context to help students understand the concept of translation. The research method used in this study is a design research validation study type with 33 ninth-th grade students of SMP Negeri 9 Palembang as subjects. Data collection techniques used include observation data collection techniques, interviews, field notes, and documentation. This study produces a Hypothetical Learning Trajectory (HLT) that can help students understand the translation concept. The resulting HLT includes four activities, namely observing contextual problems in cinemas as a starting point in understanding the concept of translation, identifying the cinema seats position as the initial points to be translated, drawing the cinema layout in cartesian coordinates to find the relationship between the coordinates of the translated point and the initial point, generalizing the shifts of the seat position to discover the concept of translation.

ABSTRAK
Penggunaan konteks dunia nyata dalam pembelajaran RME membuat konsep yang dipelajari oleh peserta didik menjadi lebih bermakna. Dalam penelitian ini, bioskop yang relevan dengan kehidupan peserta didik digunakan sebagai konteks dalam pembelajaran. Penelitian ini bertujuan untuk mengembangkan lintasan belajar berbasis pendekatan RME dengan konteks bioskop untuk membantu peserta didik memahami konsep translasi. Metode penelitian yang digunakan dalam penelitian ini adalah *design research* tipe *validation study* dengan subjek 33 peserta didik kelas IX SMP Negeri 9 Palembang. Teknik pengumpulan data yang digunakan meliputi teknik pengumpulan data observasi, wawancara, catatan lapangan, dan dokumentasi. Penelitian ini menghasilkan *Hypothetical Learning Trajectory (HLT)* yang dapat membantu peserta didik dalam memahami konsep translasi. HLT yang dihasilkan mencakup empat aktivitas yaitu mengamati permasalahan kontekstual bioskop sebagai titik awal dalam memahami konsep translasi, mengidentifikasi posisi kursi bioskop sebagai posisi awal titik yang akan ditranslasikan, menggambarkan denah bioskop dalam koordinat kartesius untuk menemukan hubungan koordinat titik bayangan dengan koordinat titik awal, menggeneralisasi perpindahan posisi kursi dan menemukan konsep translasi.

INTRODUCTION

Geometry is one of the mathematics branches that is essential for students to understand and study. Learning geometry has various benefits such as supporting the understanding of other branches of mathematics, providing applications in daily life, and helping to develop problem-solving skills (Suwito, 2018). One of the geometry topics studied at the Junior High School (JHS) is transformation geometry, which includes translation, reflection, and rotation. Understanding this material requires various mathematical skills, such as visualization skills, conceptual understanding, and critical thinking. Learning transformation geometry in the learning process can enhance spatial skills and integrate various mathematical topics previously studied separately (Pramesti & Sulistyani, 2024).

The topic of geometric transformation is fascinating if the concept can be well understood. However, in fact many students in schools still have difficulty in graps this material, particularly the topic of translation. The difficulties that students face in solving translation problems are caused by the lack of understanding the questions and concepts (Wasilah Wasilah et al., 2023). This aligns with the research findings by Luvy Sylviana Zanthy (2020) which states that the most dominant error in learning geometric transformations is conceptual errors. This difficulty can be overcome if students truly understand and comprehend the transformation properly and are able to apply it in solving problems (Hidayati & Sugeng, 2021).

Consequently, it is necessary to modify the learning design that can support students' understanding of the concept. Learning will achieve optimal results if teachers design the learning design beforehand (Erina dkk, 2023). Learning design is a systematic plan aimed to achieve learning objectives (Sustiawati et al., 2018). This design includes the process of formulating objectives, strategies, techniques, and media that will be used in the learning process (Husnan, 2019). In learning activities, teachers really need a well-structured learning design to ensure the learning process is organized effectively, thereby improving the quality and standard of education (Usman, 2018).

The learning approach that can be used in learning design is Realistic Mathematics Education (RME) (Amalia et al., 2020). RME views mathematics as a human activity that must be realistically connected to everyday life contexts (Lerman, 2020). The use of real-world contexts in RME makes the concepts learned by students more meaningful (Nuraida & Putri, 2019). Through the RME characteristics, that is the use of context and models, students are encouraged to play an active role in constructing their thinking to form mathematical concept (Agusta, 2023). This approach motivates students to discover concepts by utilizing contextual problems that are connected to learning materials.

Learning with the RME approach begins with a "real" context or situation that students have experienced. This context serves as a bridge to giude students from the concrete stage to a formal mathematics understanding (Septiani et al., 2023). This is in line with statement by Zulkardi dan Putri (2019) that context acts as a starting point for students to develop understanding and a resource for applying mathematics. A good context is one that is close to students' daily lives. Using familiar context can engage students, helping them identify and understand problems before attempting to solve it (Zulkardi, 2013).

Previous research by Hamidah et al (2024) on the design learning materials for transformation geometry using the Cirebon Red Mosque context has been conducted. Specifically, the learning design for translation topics have also been carried out with local contexts such as the historic Lawang Sewu building (Nursyahidah et al., 2020) and the Sam

Poo Kong Temple in Semarang (Lestari et al., 2021). In this study, the context used is one that is very relevant to the students' daily life, namely cinema.

The selection of the cinema context in translation learning in this study is based on several reasons. First, this context is very familiar to students, especially among junior high school students, so it is expected to stimulate their interest in learning and curiosity. Second, the visualization of the cinema layout that makes it easier for students to imagine the movement of positions on the coordinate plane, will help them understand the concept of translation more concretely. Third, this context also allows students to think critically and logically by solving problems that involve translation. Through the use of the cinema context, it is expected that students will better understand the concept of translation, develop spatial abilities, and be able to apply it to real-world situations.

This study aims to produce a learning trajectory for translation topics using the RME approach with the cinema context. This learning trajectory is expected to make students easier in understanding the concept of translation and provide a meaningful learning experience. This study is also aims to be an alternative innovation in context-based mathematics learning that is relevant to students, especially in helping students understand the transformation geometry concept.

METHOD

The research method used in this study is design research with validation study type which aims to develop a Hypothetical Learning Trajectory (HLT) for translation topics using the cinema context. The research process includes three main stages of design research according to Gravemeijer & Cobb (2006) such as: (1) preparing for the experiment, (2) design experiment, and (3) retrospective analysis as shown in the diagram in Figure 1 below.

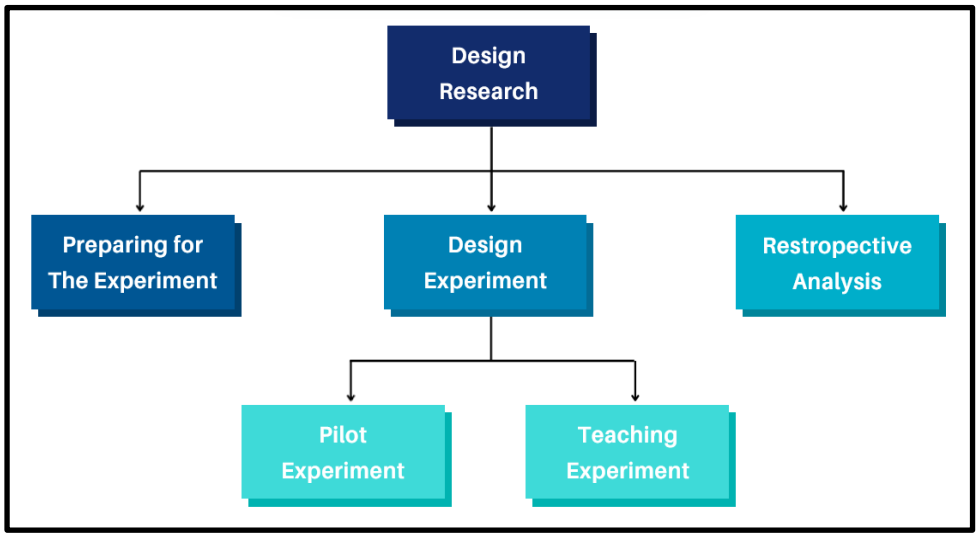


Figure 1. Design research stages

In the first stage, preparing for the experiment, an in-depth literature review was conducted on translation topic, the RME approach, and the meaning of using meaningful context in mathematics learning. Based on the results of the first stage, the researcher designed an HLT that included learning objectives, a series of context-based learning activities using cinema context, and the anticipated responses and strategies that students

might be used during the learning process. The designed HLT is dynamic so it can develop and change during the teaching experiment process.

The second stage, design experiment, consists of two cycles including a pilot experiment (cycle 1) and a teaching experiment (cycle 2). In cycle 1, the pilot experiment, the designed HLT was tested on a small group of 6 students. This trial aimed to identify weaknesses in the initial HLT. Based on the findings from cycle 1, the researcher will revise the HLT. The revised HLT will then be re-implemented in cycle 2, the teaching experiment, involving a full class of students as the research subjects. In this study, the subjects were 33 students of class IX.1 of SMP Negeri 9 Palembang.

The third stage, retrospective analysis, involves analyzing data collected during cycle 2. This analysis compares the initial assumptions in HLT with the actual learning or Actual Learning Trajectory (ALT). The results of this analysis are used to formularize a Local Instruction Theory (LIT) which provides guidance for designing and developing activities in subsequent learning.

During the study, several data collection techniques such as observation, interviews, field notes, and documentation in the form of photos were collected. Observation was used to observe students' activities during the learning process, including their responses, interactions, and strategies in solving activities to understand the concept of translation. The observation data helped identify difficulties faced by students and evaluate the effectiveness of the designed HLT. Interviews were conducted to explore students' understanding, opinions, and experiences related to the activities carried out. Field notes served to record important details that may not be captured through direct observation such as students' spontaneous reactions. Documentation was used to capture key moments during the learning process, supporting visual analysis of students' activities and the implementation of HLT.

The collected data were analyzed retrospectively by referring to the created HLT. The data analysis process was carried out descriptive qualitatively, highlighting the emerging learning patterns, challenges experienced by students, and the success of the strategies implemented. This process aims to improve HLT so that it is more in accordance with the needs of students and supports a deeper understanding of the concept of translation.

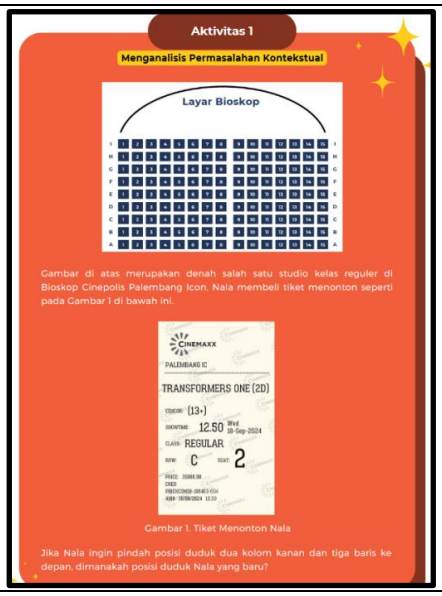
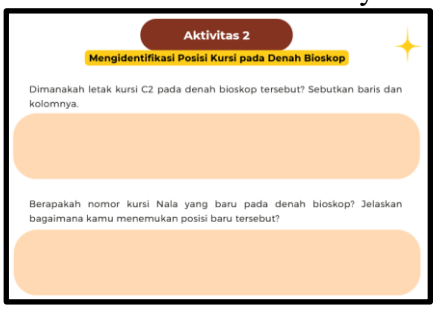
RESULT AND DISCUSSION

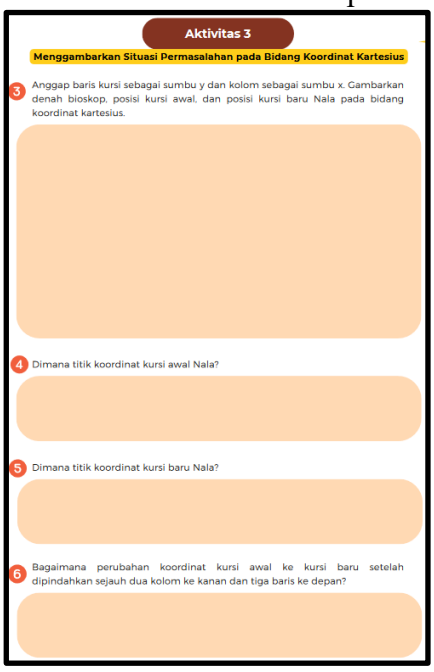
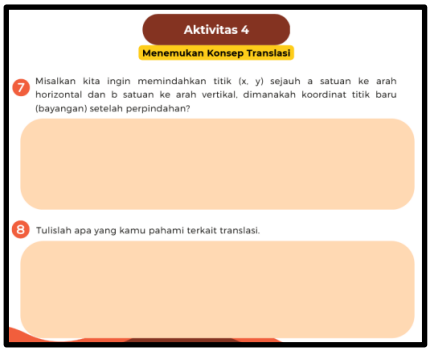
In this study, learning was carried out through several activities designed using the cinema context to help students understand the concept of translation. The following is a description of the stages of developing the HLT with the context of cinema.

The preparing for the experiment stage was conducted through literature review related to the junior high school curriculum on translation topic, RME approach theories, and the use of good context in mathematics learning. The results of this stage were used to design the initial HLT consisting of three components including learning goals, learning activities, and hypothetical learning processes/conjectures (van Eerde, 2013). The initial HLT designed by the researcher can be seen in Table 1 below.

Table 1. Initial HLT cinema context

Learning Goal	***Learning Activities***	***Hypothetical Learning Processes/Conjecture***
Students can analyze the contextual problems given	Observe and understand the cinema layout, cinema tickets, and the problems given.	a. Students can understand the cinema layout, cinema tickets, and the problems given as a whole.

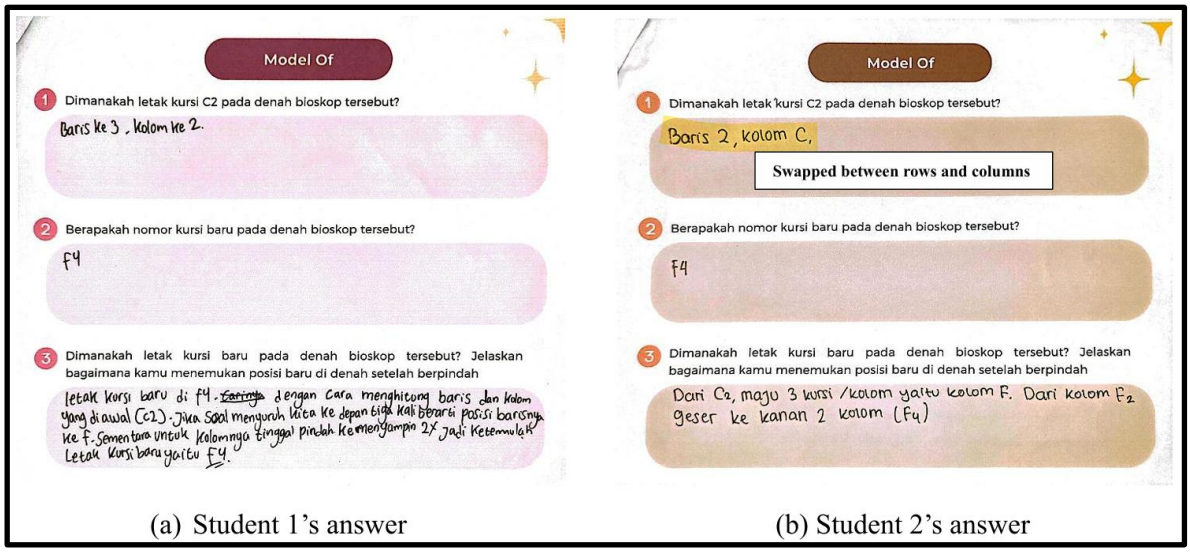
as starting point in understanding the concept of translation.		b. Students are able to read the problems given, but have difficulty in understanding the information presented through the layout and cinema tickets.
Students can understand the meaning of cinema seat numbers as the initial position of the point to be translated.	Identifying the seat position on the cinema layout. 	a. Students identify the row and column of the initial seats position according to the cinema layout (rows with alphabet and columns with numbers). b. Students represent the seat rows using numbers and identify the row and column of the initial seats position with numbers. c. Students determine the new seat position by calculating or adding the seat shift. d. Students determine the new seat position by moving or shifting the initial seat position om the cinema layout.
Students can indentify the relationship between the coordinates of the translated points and the initial point coordinates.	Drawing the cinema layout, the initial seat position, and the new seat position on the Cartesian	a. Students draw the cinema layout using the Cartesian coordinates in quadrant I. b. Students draw the cinema layout using the complete Cartesian coordinates with 4 quadrants. c. Students draw the cinema layout using the Cartesian coordinates in quadrant II. d. Students draw the cinema layout with the Cartesian

	coordinate plane.  	coordinate center point between columns 8 and 9. e. Students draw the cinema layout with the Cartesian coordinate center point between columns 8, 9 and rows E. f. Students draw a cinema layout with the Cartesian coordinate center point between columns 8, 9 and rows E, D. g. Students draw a cinema layout with the Cartesian coordinate center point in row E column 8. h. Students draw a cinema layout with the Cartesian coordinate center point in the bottom-left corner of the layout. i. Students determine the initial and new seat coordinates according to the Cartesian coordinates created. j. Students realize that the new seat coordinates are the initial seat coordinates that increase according to their displacement.
Students can understand that changes or displacements or shifts of a point are translations.	Generalize the displacement of a point and discover the concept of translation.  	a. Students write the coordinates of a new point (shadow) formally, namely (x+a, y+b). b. Students write the new coordinates (shadow) informally, such as coordinate x plus a and coordinate y plus b. c. Students understand that translation is the movement from the starting point to the ending point on the coordinate plane. d. Students understand that translation is the movement from one place to another. e. Students understand that translation is the movement of a point.

The HLT in Table 1 was validated by three experts in mathematics education. After validation, the HLT was revised according to the expert's suggestions and comments. The revised HLT results have included the characteristics and principles of RME.

The design experiment stage includes two cycles. The first was pilot experiment or cycle 1. In this cycle, 6 students participated in testing the HLT. In activity 1, students were asked to analyze contextual problems given as a starting point in understanding the concept of translation. In line with the statement by Fitriani & Yuliani (2016) that the right context can be used as a starting point in learning. Based on the researcher's observations, students generally understood the presented problems and were able to show the location of seat C2 on the cinema layout.

In activity 2, students were asked to identify the seat position on the cinema layout. In addition, students were also asked to estimate the position of Nala's new seat by looking at the given layout and explaining the strategy they used in finding the new seat position. This activity aims to enable students to understand the meaning of cinema seat numbers as the initial point that will be translated. Below are the examples of student answers.



(a) Student 1's answer (b) Student 2's answer

Figure 2. Examples of student answers in activity 2 cycle 1

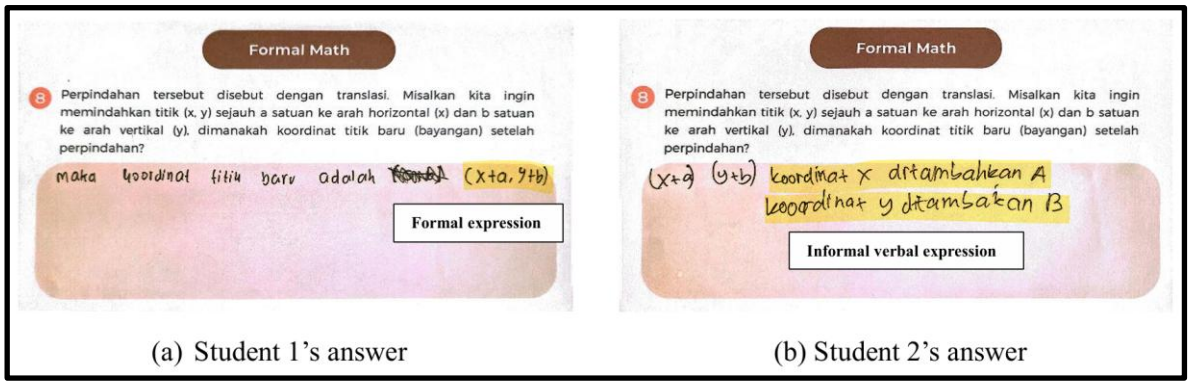
Based on Figure 2, differences can be observed between the response of student 1 and student 2. Student 1 was able to correctly identify the position of seat C2. Student 1 assigned numbers to the cinema rows labelled with alphabets, indicating that seat C2 is located in the 3rd row and 2nd column. Meanwhile, student 2 still writes the seat position according to the cinema layout using numbers and alphabets. However, student 2 is still confused with the concept of rows and columns, labelling rows ad columns and vice versa. This is in line with the results of research by N. Hamidah & Setiawan (2019) that one common error made by students is interchanging rows and columns. This misunderstanding was revealed by student 2 during the interview.

Researcher: "Where is the seat C2?"
Student: "In row 2 column C"
Researcher: "Where is row 2?"
Student: "The vertical number 2 is row 2"
Researcher: "Where is column C?"

Student: "The horizontal one C is column C"

Both students were able to estimate the new seat position by visualizing the seat shift on the provided cinema layout. As shown in Figure 2, both students explained their strategies in finding the seat's new position. Student 1 used a method of counting rows and columns from the initial by calculating the rows and columns from the initial chair, while student 2 by shifting the position of the initial chair according to the known displacement.

In activity 3, students were directed to find the concept of coordinate changes, where the new seat coordinates are the initial seat coordinates added to the displacement. Subsequently, in activity 4 students were guided to determine a shadow point if point (x, y) is moved a units horizontally and b units vertically. Through activity 4, students were expected to generalize the displacement of a point and discover the concept of translation. Examples of student answers for activity 4 can be seen in Figure 3 below.



(a) Student 1's answer (b) Student 2's answer

Figure 3. Examples of student answers in activity 4 cycle 1

As shown in Figure 3(a), the students have been able to write the concept of translation formally, stating that the new coordinates after translation are (x+a, y+b). This is different from the response of the student in Figure 3(b), who wrote the concept of translation informally in their own words, saying that the x coordinate is added to A and the coordinate y is added to B. Both students have been able to write the coordinates of the translated point correctly. However, some students could not express the meaning of the translation itself. They understood that translation is a displacement as mention in question number 8. This was conveyed by students in the interview.

Researcher: "After working on LAS, what is translation?"
Student: "Translation is a displacement miss"
Researcher: "What kind of displacement?"
Student: "Still bit confused miss, but it is written that displacement is trasnlation"

Student answers in the pilot experiment of cycle 1 were used as evaluation material to revise the series of activities in the student activity sheet (Utari, 2017). During observations, researcher found that students were still confused about the meaning of seat C2 location. Most students asked what question number 1 meant in activity 2. This confusion was cause by the unclear question wording. This aligns with the findings of Halawa et al (2024), which stated that one of the causes of students' errors in solving mathematics problems is unclear question phrasing or sentence structure. Therefore, the researcher decided to clarify the question by asking students to mention the rows and columns of the

seat. The use of clear and simple sentences can help students understand the instructions presented on the Student Activity Sheet (Nareswari et al., 2021).

In addition, the researcher decided to combine questions number 2 and number 3 according to expert suggestion. Furthermore, researcher also changed the title of each activity based on feedback from colleagues. Initially, each activity was titled according to the RME modeling level, namely contextual problem, model of, model for, and formal math, but these were revised to activities 1 - 4 with a brief explanation for each activity. The changes made to activity 2 can be seen in Figure 4 below.

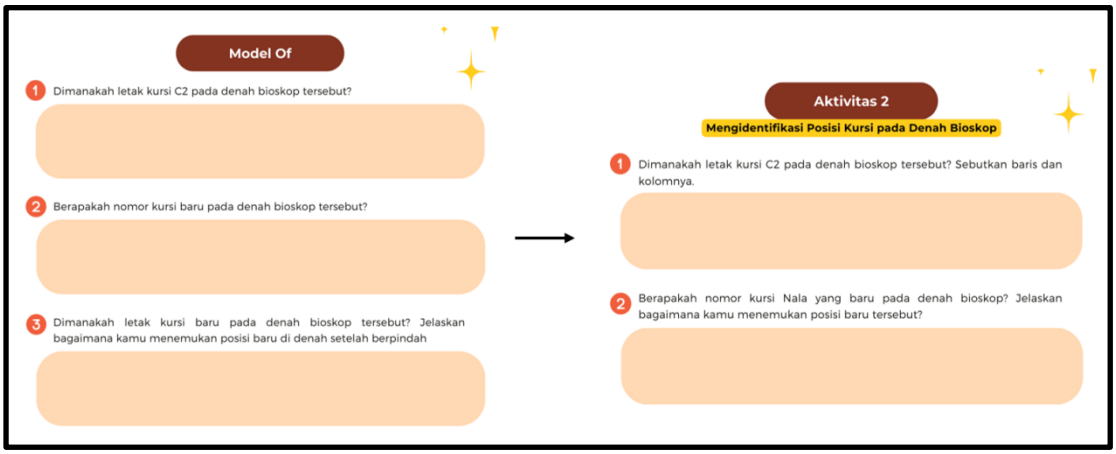


Figure 4. Activity 2 before and after

Additionally, based on observations and interviews, students can understand that translation refers to displacement because the wording in activity 4 explicitly stated that "displacement is translation". Consequently, students do not have the opportunity to express their understanding of translation after completing activities 1-4. Therefore, the researcher decided to revise activity 4 by removing the information "displacement is translation" and adding a column for students to express their understanding of translation. The revised revision tested in cycle 2 of the teaching experiment. The activity 4 before and after revision can be seen in Figure 5 below.

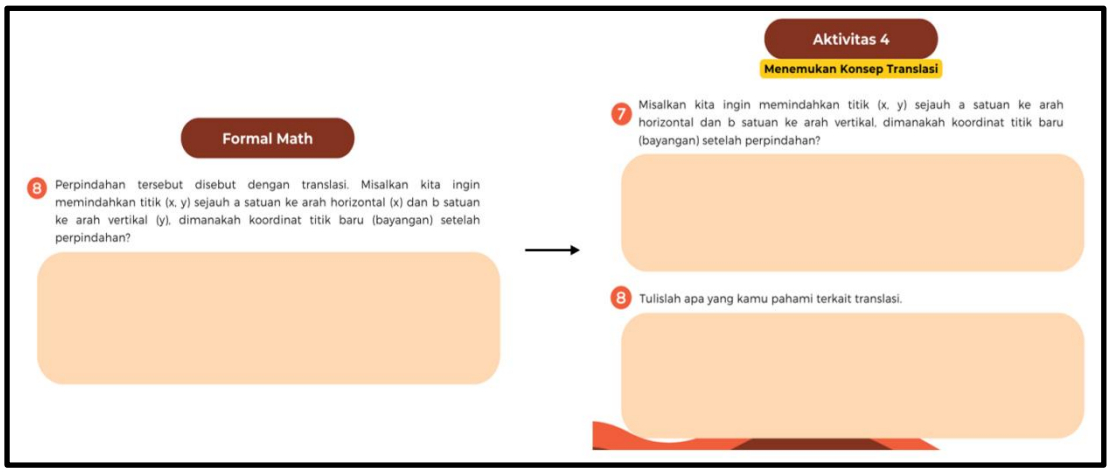


Figure 5. Activity 4 before and after

In cycle 2 or teaching experiment, the activity sheet was tested on 33 students. The students were divided into small heterogeneous groups of 4-5 people. The total groups formed were 8 groups with 7 groups consisting of 4 people and 1 group consisting of 5 people. The first activity carried out by students was analyzing contextual problems related to the cinema can be seen in Figure 6 below.

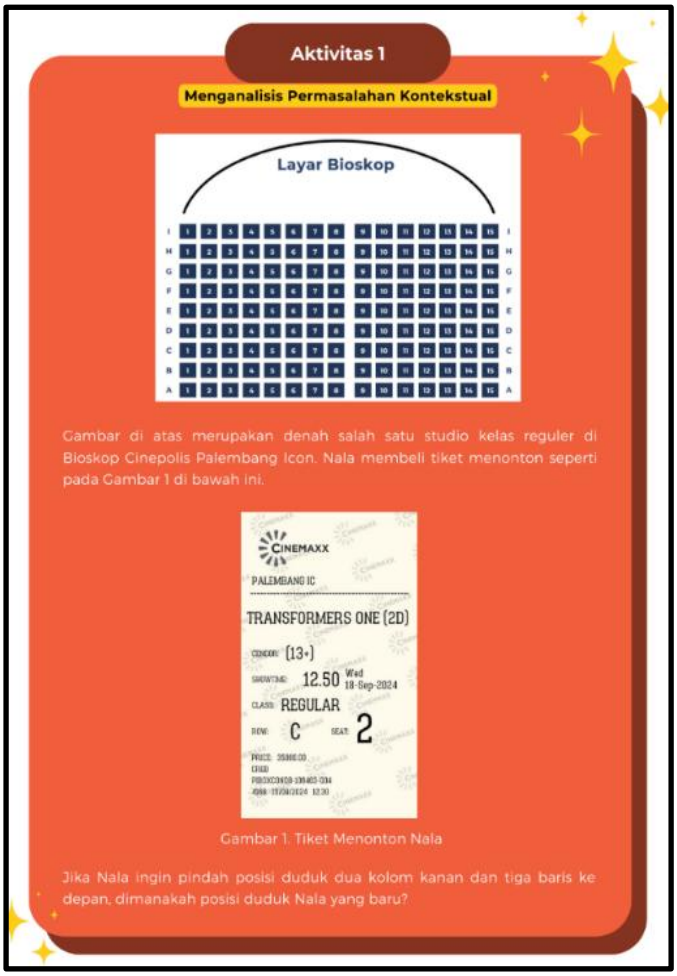


Figure 6. Activity 1 contextual problem related to cinema layout

In Activity 1, a cinema layout from a regular studio at the Cinepolis Palembang Icon Cinema and a picture of a cinema ticket purchased by Nala were presented. The problem required students to determine Nala's new seating position after moving based on the given displacement. In this activity, students were asked to observe and understand the given problem. This activity leads students to examine and understand contextual problems as a starting point for constructing an understanding of the concept of translation. In line with the PMRI approach which uses reality as a starting point in the learning process to help students recreate mathematical concepts (Apriyanti et al., 2023). Based on the researcher's observations, students were able understand the problem and identify the position of seat C2 on the cinema layout. Moreover, they were also able to estimate Nala's new seat position by looking at the layout provided.

Based on questions and answers with students, the cinema context is not something foreign to them. All students in the class admitted that they had watched a movie in the cinema. Additionally, they already understood that cinema seats are numbered according to

rows and columns. This familiarity makes students more interested in participating in the learning process (Wiranata & Sujana, 2021). In parallel, the learning that is carried out also became more meaningful for the students.

Furthermore, in the activity 2, students were asked to interpret the position of seat C2 and write down a strategy for finding a new seat position. This activity is designed so that students are able to interpret the position of seat C2 as a representation of the initial point before translation. During his stage, the researcher found quite interesting student answers as shown in Figure 7 below.

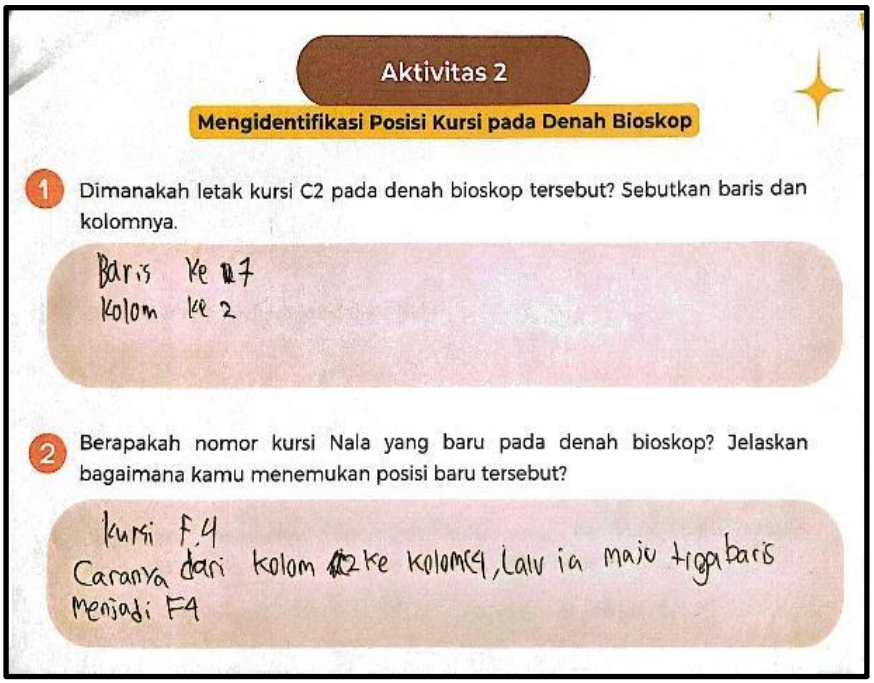


Figure 7. The most accurate student answer regarding the position of the C2 seat

In answering question number 1 in activity 2 cycle 2, most of the student groups answered that C2 seat is located in row C column 2 or row 3 column 2. However, the student's answer in Figure 7 indicated that C2 seat is located in row 7 and column 2. This is because the student group counted the rows starting from the top or row I. The following is an interview dialogue related to this activity.

Researcher: "So, where is C2 seat?"
Student: "C2 is located in row 7 and column 2"
Researcher: "Why is that?"
Student: "We counted the rows from the front seat, row I becomes row 1 so row C means row 7. Meanwhile, column is counted from the left so 2 means the second column"

The answer of this student group is the most accurate among all groups. They counted the rows from the top and the columns from the left. This is in accordance with the concept of rows and columns in the matrix, where the first row is the top row and the first column is the leftmost column (Hapsan & Astuti, 2024). Thus, the students group found that seat C2 is located in row C or 7 and column 2.

In activity 3, students were asked to represent a real-world situation as a mathematical model. In this activity, students were instructed to sketch the cinema layout, the initial seat position, and the final seat position on a coordinate plane. This activity is one of the crucial activities because through this activity, students can find the relationship between the translated point coordinates and the initial point coordinates. In line with what was stated by Subekti et al. (2021) that students' visual representation in Cartesian coordinates is an important aspect in understanding mathematics.

The center point of the coordinates is not specified, so students are free to create Cartesian coordinates according to their understanding and creativity. As a result, students' answers were highly varied, depending on the center point position of the coordinates they determine. The variation in student groups answers for activity 3 can be seen in Figure 8 below.

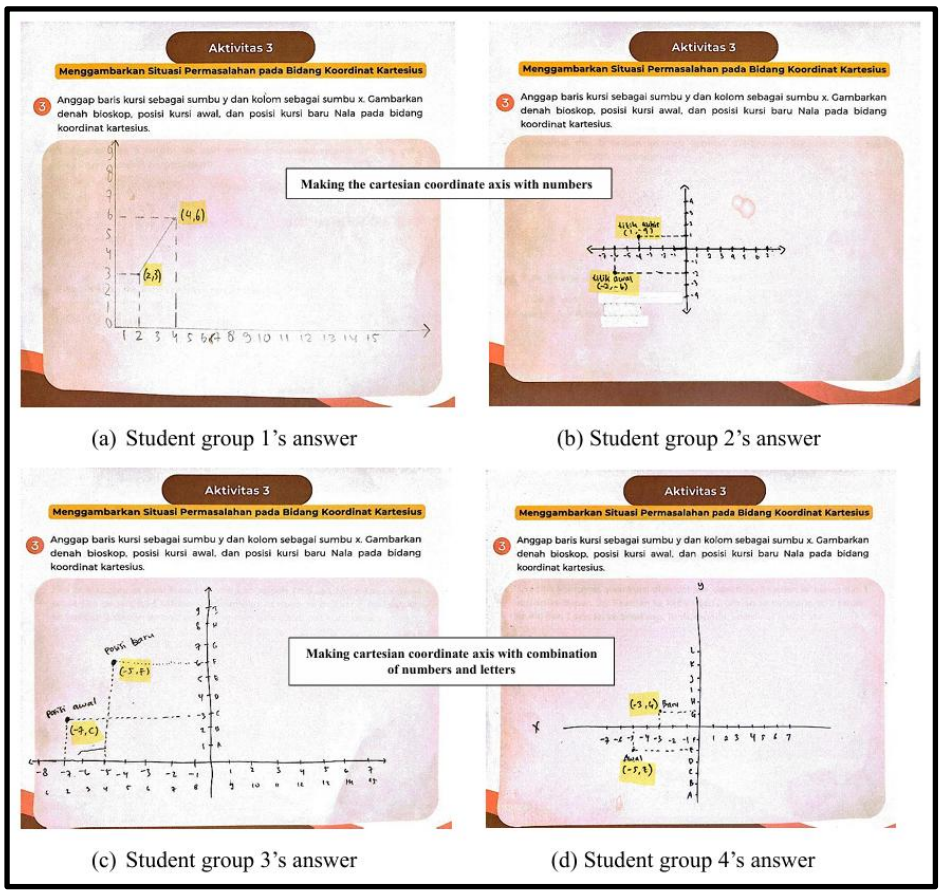


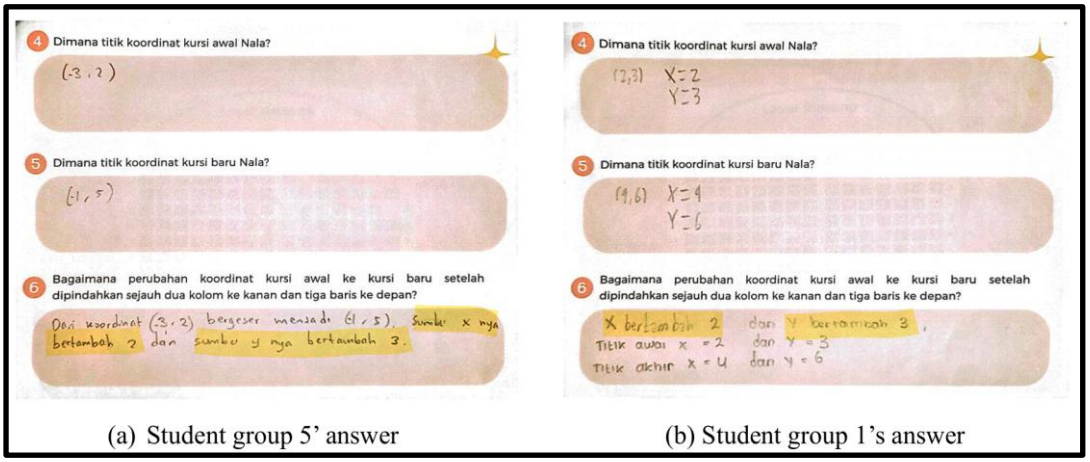
Figure 8. Students' different strategies in representating cinema layout on coordinate plane

In drawing Cartesian coordinates, some student groups represented the rows labelled with alphabets using numbers, as shown in Figures 8(a) and (b). In Figure 8(a), students assume the bottom-left corner of the cinema as the center point (0, 0) and row A column 1 as point (1, 1). This group focused on the first quadrant of coordinate plane. Using the model created, students describe seat C2 as point (2, 3) and after moving two columns to the right and two rows forward, the final seat position became (4, 6). This model was the one created by most students in the pilot experiment. In contrast, the answer from the student in Figure 8(b) divided the cinema layout into 4 section and sets seat E8 as the center point of the

coordinates. Thus, the position of seat C2 on the coordinate plane was at point (-6, 2) and after moving became point (-4, 1).

Another unique response was provided by the group that drew the Cartesian coordinates based on the cinema seating arrangements, using alphabets for the y-axis. This can be seen in Figure 8(c) where students divided the cinema layout into 2 section and placed the x-axis under row A and the y-axis between columns 8 and 9. According to the model created, seat C2 was in quadrant II precisely at point (- 7, C) and the final seat at point (-5, 6). A similar approach can also be seen in the answers of the student group in Figure 8(d). This group places seat C2 in quadrant II. However, the center point chosen was between rows F and G and the 8th column. Consequently, they determined that the initial seat was at point (-5, E), while the new seat was at point (-3, G). The differences in the coordinate representations made by each group have direct implications for determining the position of the initial point to be translated. The variations in mathematical models they built became the main foundation in determining the direction, distance, and position of the translated point. Therefore, this representation process plays a crucial role in shaping students' conceptual understanding of translation.

After sketching the cinema layout, the initial seat position, and the final seat position on a coordinate plane, in activity 3 students were asked how the initial seat coordinates changed to the new seat after moving two columns to the right and two or three rows forward. Although the initial point coordinates that students have are different according to the mathematical model created, this question led students to realize that the new seat coordinates are the initial seat coordinates that added according to its displacement. This understanding was reflected in the students' answers to activity 3 numbers 4 - 6 as follows.



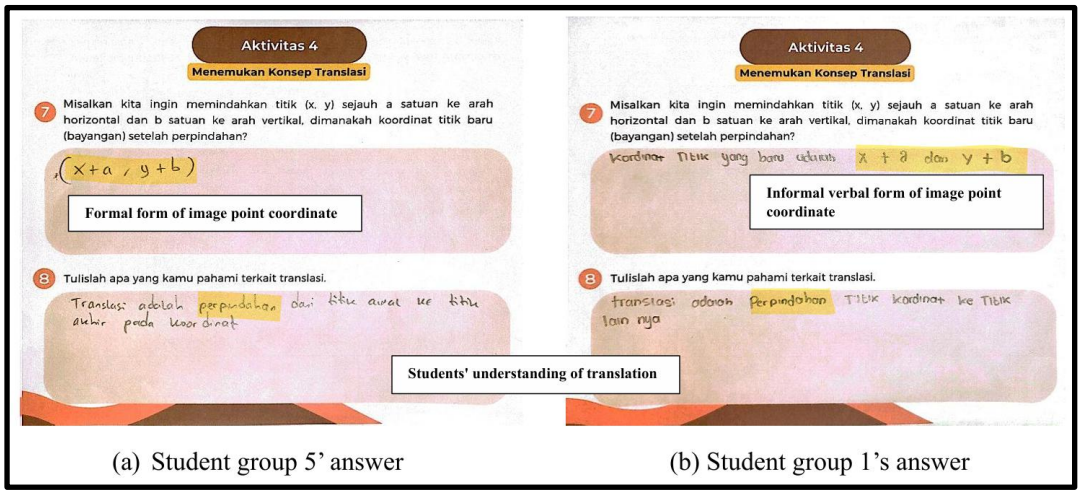
(a) Student group 5' answer (b) Student group 1's answer

Figure 9. Example of student answers regarding changes in seat coordinates

As shown in Figure 9 for question number 6, students known that the change in the coordinates from the initial seat to the new seat increased according to the displacement. In this case, although in questions 4 and 5 students get different coordinates of the initial and new seat according to the Cartesian coordinates made, students find that the x-axis coordinates of the initial seat that is moved two columns to the right increase by 2. Meanwhile, the y-axis coordinates of the initial seat that is moved three rows forward increase by 3.

After students realized that the final seat coordinates are the same as the initial seat coordinates added to its displacement, students were instructed to complete activity 4. This

activity contained generalization questions aimed at helping students to rediscover the concept of translation formally. Examples of student answers for activity 4 can be seen in Figure 10 below.



(a) Student group 5' answer (b) Student group 1's answer

Figure 10. Generalization and students' understanding of point translation

Based on Figure 10, it is evident that students were able to generalize and determine the coordinates of the new point (shadow) of point (x,y) that is moved horizontally by a and vertically by b. Some students successfully wrote the coordinates of the shadow point formally as in Figure 10(a). However, there are also few groups of students who still write the shadow point coordinates in their own language as in Figure 10(b).

In addition to generalizing the concept of translation formally, activity 4 also required students to summarize their understanding of translation. Based on students' answers to question number 8 in Figure 10, it can be seen that in general, students understand translation as the movement or change in position of an object from the initial position to the final position. Thus, students have showed a strong understanding of the translation concept because they are able to reconstruct the translation concept and explain it formally (Sari & Susanah, 2023).

At this stage, the HLT conjecture at the design experiment stage of cycle 2 is compared with the actual work results of students or ALT (Friansah et al., 2024). The activities designed by the researcher aimed to provide meaningful learning for students on the topic of translation, facilitating their understanding of the concept. Students have worked based on hypothetical learning conjectures or initial assumptions/conjectures that have been predicted. Various answers emerge in solving the given problems.

To anticipate students' strategies or thoughts processes, the conjectures in the HLT were constructed to align with students' thinking strategies (Utari, 2017). Therefore, the solutions to the questions written by students are in accordance with the designed HLT. Various answers and strategies arose were in line with the predicted conjectures. From the activities conducted, students understood that translation is the movement or change in position of an object from the initial position to the final position. This is shown in the answers of students who have succeeded in writing the translation concept formally. The implementation of learning activities with RME approach using a context that is close to students effectively enhanced students' understanding in translation topic (Lestari et al., 2021).

Based on the comparison of HLT and ALT, as well as previous relevant theories or research on RME-based learning of translation material, the designed HLT is deemed successful in helping students understand the concept of translation. The learning trajectory developed and implemented in this study provides a positive contribution to the development of LIT in learning translation topic. This learning trajectory was designed based on RME theory, guiding students to move from the informal stage to the formal stage. The designed learning activities enabled students to model their own problem-solving strategies. Neverthless, the formal stage they achieved is the same, the concept of translation.

CONCLUSION

The Local Instruction Theory (LIT) produced in this study includes four main activities: observing a contextual problems related to cinema as a starting point in understanding the concept of translation, identifying the position of cinema seats as the initial position of the point to be translated, drawing a cinema layout to find the relationship between the shadow point coordinates and the initial point coordinates, and generalizing the movement of the seat position to derive the concept of translation. The use of cinema contextual problems that are very relevant to students' lives, makes the problem more familiar to the students. Through cinema contextual problems, students can find the concept of translation and learn examples of translation situations in everyday life. Based on the research findings, the designed activities using the cinema context can help students understand the concept of translation.

However, this study has a limitation. The scope of learning objectives are confined to understanding the concept of point translation. This study has not covered translations on other geometric objects such as lines and planes, which could serve as a focus for the further research. Further research has the opportunity to explore the development of other contextual learning activities that can bridge the understanding of translation in more complex geometric shapes.

The practical implication of this study for teachers is that the use of familiar contexts to students', such as cinema, can be an effective approach in learning abstract mathematical concepts. Teachers can adapt or develop similar contexts to help students relate real experiences to abstract concepts, so that learning becomes more meaningful and easier to understand.

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