Effect of isomorphic problems with feedback to reduce student misconceptions on simple harmonic motion

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Abstract
This research aims to investigate the effect of isomorphic problems with feedback to reduce student misconceptions about Simple Harmonic Motion. This study is quantitative research with One Group Pretest-Posttest Design. Respondents were given pretest and posttest using a four-tier diagnostic test instrument. A sample of 33 students from Grade XI IPA was selected using simple random sampling. The treatment involved providing formative assessment based on isomorphic problems with feedback. McNemar's test analysis revealed that 13 indicators had p-value <0.05, which means that Ha is accepted, indicating a significant difference in student misconceptions before and after the treatment. Indicator number 10 had p-value of 0.250 ($p \geq 0.05$), which means that H_0 is accepted, signifying no significant difference in student misconceptions before and after the treatment. DQM analysis showed a decrease in misconceptions with an average effectiveness of 92% (high category). The Wilcoxon test resulted in a p-value of 0.000($p < 0.05$), thus H_a is accepted, indicating a significant difference in student conceptions before and after the treatment. The conclusion of this study is that there is a significant difference in student misconceptions before and after the treatment using formative assessment with isomorphic problems and feedback with high effectiveness in reducing misconceptions.

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1. Introduction

The concept of Simple Harmonic Motion (SHM) is closely tied to everyday life, making it essential for students to learn and understand. However, in reality, many students struggle with misconceptions related to SHM (Amalia & Oktavianty, 2018). Research by Rahmawati (2021) revealed that students' misconceptions regarding SHM were as high as 61% in the topic of amplitude. Similar results were found in the study by Ramadani, et al (2021), which reported that 51.86% of students had misconceptions about SHM. On the other hand, Mahen & Nuryantini, (2018) research indicated that 32.2% of students had misconceptions about SHM. These studies collectively demonstrate a relatively high prevalence of misconceptions among students in the SHM topic. Misconceptions refer to situations where students have inaccurate understandings of a concept, misuse concepts, misclassify examples in relation to concept application, assign different meanings to a concept, confuse different concepts, and incorrectly establish hierarchical relationships between concepts (Rahmawati et al., 2019). Misconceptions and not understandings of concepts arise because of the lack of solid understanding that students have (Khoiri et al., 2024). Students with misconceptions may either genuinely lack an understanding of a concept or have developed misconceptions (Mahen & Nuryantini, 2018). Students with misconceptions often believe their understanding is correct, even when it deviates from the theory (Hajiriah et al., 2019). Another factor contributing to student misconceptions is that the source material they learn from may be accurate, but their interpretation is flawed, leading to misconceptions (Tarisalia et al., 2020). Given these results and explanations, it is evident that a significant number of students struggle with misconceptions in the SHM topic, necessitating efforts to reduce them. This is in accordance with the important focus of many studies that discuss concept understanding problems(Mihret et al., 2023).

Misconception reduction is an educational endeavor aimed at minimizing and eliminating students' misconceptions or misunderstandings of specific concepts, ensuring that their understanding of those concepts aligns accurately (Prasetyo et al., 2020). Reducing misconceptions is crucial, as misconceptions are a common issue that often arises after the learning process. It is important to

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identify the factors that cause misconceptions (Resbiantoro & Setiani, 2022) . Misconceptions become a serious problem if left unaddressed and unimproved (Rohmah & Fadly, 2021). Unlike students who lack a general understanding of a concept, students with misconceptions are challenging to correct because they often have a high level of confidence in their flawed understanding (Mukhlisa, 2021).

Numerous efforts to reduce misconceptions in SHM have been made, including Mahen & Nuryantini (2018) using the STS model in teaching to reduce students' misconceptions about simple harmonic vibrations. Their results demonstrated that the STS model effectively reduced misconceptions with high effectiveness. In contrast, Alqadri et al (2020) applied the NOVICK learning model to remediate students' misconceptions regarding SHM. Their research showed that the effectiveness of reducing student misconceptions with the NOVICK model in SHM was moderate. Khairunnisa et al (2018) also conducted research on integrating remediate misconception with the ECIRR conceptual change model for SHM, and they found that the ECIRR model was highly effective, $\Delta S = 0.7275$, in reducing students' misconceptions.

However, the methods used to reduce misconceptions primarily focus on implementing specific teaching models. In this study, the researchers aim to reduce student misconceptions on the SHM topic by using formative assessment in the form of isomorphic problems with feedback. Formative assessment based on isomorphic problems can improve conceptual understanding by providing instant feedback tailored to the issues and problems students faced (Kusairi, 2020). The feedback offered consists of material corresponding to the indicators that need improvement to correct ' misconceptions. Formative assessment is chosen because it is considered more efficient, requiring less time and being flexible in implementation (Tohir, 2019). Moreover, it is often impractical to repeat the entire learning material due to time constraints Megalina (2019), so reducing misconceptions using formative assessment with isomorphic problems and feedback is a viable solution.

Isomorphic problems are different representations of the same physics concept. These problems have the same level of difficulty within an indicator but are presented in different forms, allowing for variation in the questions, and can be used to measure understanding (Ningsari et al., 2021). These problems serve as the basis for developing feedback given to students (Kurniawan et al., 2021). Offering feedback within the question items can provide quick responses to students, enhancing their understanding, reducing misconceptions (Sulistyowati et al., 2017).

The reason for using isomorphic problems as an instrument to reduce misconceptions is that they offer an opportunity to address misunderstandings of complex physics concepts, which often require high-level reasoning (Attaqie, 2021). In addition, it is still rare for previous studies to use isomorphic problems with feedback to reduce misconceptions. Previous studies focused on using isomorphic problems to identify students' misconceptions, such as those conducted by (Tatsar et al., 2017; Alatas et al., 2021). PowerPoint has the advantage of easy access and does not require special skills in developing (Kurniawan et al., 2020). He also noted that the easy access to PowerPoint can encourage teachers to develop isomorphic problems instruments in their schools.

Hence, the researchers aimed to conduct further research on reducing student misconceptions in the SHM topic, titled "The Effect of Isomorphic Problems with Feedback to reduce students' misconceptions on Simple Harmonic Motion." This research also assessed the effectiveness of formative assessment based on isomorphic problems with feedback in reducing student misconceptions in the SHM topic.

2. Method

This study employed the One Group Pretest-Posttest Design, which includes conducting initial and final tests for a single group. Sugiyono (2022) explained that the results of the treatment using the One-Group Pretest-Posttest Design can be more accurate as it involves comparing data before and after the treatment. The chosen design aligns with the research objective, which is to determine the effectiveness of formative assessment based on isomorphic problems with feedback in reducing student misconceptions in the topic of SHM. The research pattern using the One Group Pretest-Posttest Design is depicted in Table 1.

Table 1. One Group Pretest Posttest Design Research Design (Sugiyono, 2022)

Pretest	Treatment	Posttest
O_1	X	O_2

O_1 : Pretest Score (Initial Test)
X : Isomorphic Assessment with Feedback (Treatment)
O_2 : Posttest Score (Final Test)

The research was conducted at SMA Negeri 1 Singosari, with the target population being Grade XI IPA (Science) students. The research sample consisted of 33 students, chosen through simple random sampling. Simple random sampling was employed because all Grade XI students at SMA Negeri 1 Singosari had relatively similar abilities, as there was no grouping or classification of students based on specific criteria, and they had completed the SHM material.

Data collection techniques in this research involved the use of tests. The research instrument used a four-tier diagnostic test. The test was used to identify students' misconceptions (Jubaedah et al., 2017). The test was conducted twice, namely pretest and posttest. The pretest was used to ascertain misconception profiles before the intervention, and the posttest was employed to determine these profiles after the intervention. The four-tier diagnostic test instrument was adopted from Siahaan's research, comprising 14 items that underwent validity and reliability testing. It was deemed valid (>0.213) and reliable with a reliability coefficient of 0.852302 using Microsoft Excel 2010 and 0.820735 using IBM SPSS 25 (Siahaan, 2021).

The research treated the experiment class using formative assessments based on isomorphic problems with feedback using PowerPoint. The isomorphic problems are test instruments comprising three items with the same problem-solving concept for each indicator, accompanied by feedback, aimed at reducing students' misconceptions in the Simple Harmonic Motion (SHM) topic based on the results of the pretest.

The isomorphic problems instrument differs from the four-tier diagnostic test instrument. The four-tier diagnostic test used to diagnose and categorize students based on their understanding, namely understanding the concept, partial understanding, misconceptions, and not understanding the concept. The instrument consists of four levels of problems: the question itself, the confidence level in the answer, the reasoning behind the answer, and the confidence level in the reasoning. Essentially, the four-tier diagnostic test instrument is composed of a single question, complemented with reasoning and students' confidence levels in their answers. Thus, tiers 2, 3, and 4 in this instrument function to solidify students' understanding.

In contrast, the isomorphic problems instrument comprises three items with the same problem-solving method but presented in different representations. It is used to identify general issues in students' understanding. The isomorphic problems instrument does not delve into reasoning or confidence in the answers but emphasizes consistency in students' answers based on their understanding. When students can consistently answer the questions, they are considered to have understood the concept. However, if students are inconsistent in their responses to the three isomorphic problems, they are considered to have issues with their understanding, such as misconceptions, requiring follow-up in the form of feedback. This feedback will correct students' misconceptions. Variations in isomorphic problems can also enhance the confidence level in the answers provided for a specific indicator.

The isomorphic problems instrument was developed based on the four-tier diagnostic test question indicators and underwent expert content validation with a very valid result of 90%. This result indicates that the isomorphic problems instrument is highly suitable for use as a tool to reduce student misconceptions about the SHM topic. Isomorphic problems validated as such were then presented in Microsoft PowerPoint in accordance with the isomorphic problems template and format. The PowerPoint medium also underwent practicality testing with Grade XI students who had completed the SHM material. The practicality test yielded a 94% percentage with the category of very practical.

The developed PowerPoint medium requires students to correctly answer three isomorphic problems within one indicator. Afterward, students are directed to the discussion slides to reinforce the material before moving on to the next indicator. However, if students cannot answer all three isomorphic problems correctly, they will be directed to the material slides corresponding to the indicator as feedback to improve their conceptual misunderstandings and misconceptions. After reading the material slides, students are guided to reattempt the problems based on the indicator until all three are answered correctly. The treatment is concluded with a posttest to measure the profile of student misconceptions after the treatment. The posttest results are compared with the pretest results to determine the percentage of reduction in misconceptions or improvement in students' conceptual understanding. The answers to the pretest and posttest are interpreted based on the rubric for interpreting the results of the four-tier diagnostic test, as presented in Table 2.

Table 2. Interpretation Four Tier Diagnostic Test (Astuti et al., 2023)

N	Tier 1	Tier 2	Tier 3	Tier 4	Category
1	1	1	1	1	Understand The Concept
2	1	1	1	0	Partially Understand
	1	0	1	1	
	1	0	1	0	
	1	1	0	0	
	1	1	0	1	
	1	0	0	1	
	1	0	0	0	
	0	1	1	1	
	0	1	1	0	
	0	0	1	1	
	0	0	1	0	
3	0	1	0	0	Don’t understand the concept
	0	0	0	1	
	0	0	0	0	
4	0	1	0	1	Misconceptions

The interpretation of students' answers is presented in the form of bar charts to determine their conceptions during the pretest and posttest. Pretest and posttest conception profiles can also be used to ascertain changes in students' conceptions, whether in understanding the concept, partial understanding, misconceptions, or not understanding the concept. After identifying the profiles of students' conceptions, the next step involves testing through non-parametric statistical analysis, specifically the McNemar test.

The McNemar test is used to analyze two sets of paired binomial data by utilizing a 2x2 congruence table (Pembury Smith & Ruxton, 2020). The McNemar test is employed to determine the difference in misconceptions before and after the treatment involving formative assessments based on isomorphic problems with feedback. The McNemar statistical test emphasizes the aspects of testing conducted before and after the treatment.

The McNemar test was chosen because the data being analyzed consists of nominal data in the form of student conception categories as outlined in Table 3. The McNemar test was conducted using IBM SPSS 25 software and employed an auxiliary table to facilitate data presentation.

Table 3. The McNemar Test Auxiliary

Before Treatment	After Treatment	
	Not Misconceptions	Misconceptions
Misconceptions	A	B
Not Misconceptions	D	C

A = Misconceptions turned into not-misconceptions
B = Misconceptions remained as misconceptions
C = Not-misconceptions turned into misconceptions
D = Not-misconceptions remained as not-misconceptions

The next analysis is carried out using the Decreasing Quantity of Misconception (DQM) test. The DQM test is employed to determine the percentage and effectiveness of reducing students' misconceptions between the pretest and posttest results. The formula for calculating the DQM value is can be seen in formula (1) (Kurniawan et al., 2019). the ideal percentage of misconceptions, which in this case is 0%.

$$DQM = \frac{\%\,Pretest - \%\,Posttest}{\%\,Pretest - \%\,Ideal}100\% \qquad (1)$$

The research data is also presented in the form of continuous data, allowing for analysis with parametric statistical analysis using paired t-tests. However, if the data does not meet the prerequisites for a normal distribution or homogeneity, it is analyzed using non-parametric statistical analysis using the Wilcoxon test with IBM SPSS 25 software.

Based on the explained analysis methods, this research is generally divided into three stages: the preparation stage, including defining the problem and objectives, determining the design, and selecting the instruments; the implementation stage, including the pretest, analysis of pretest results, treatment with isomorphic problems, posttest, and analysis of posttest results; and the final stage, consisting of pretest and posttest analysis, hypothesis testing, drawing conclusions, and preparing the report.

3. Results and Discussion

3.1. Students' Conception Profiles

The students' conception profiles were obtained based on the combination of responses from the four-tier diagnostic test used for the pretest and posttest. The students' responses were categorized into students who had a good understanding of the concept, those who had a partial understanding, those with misconceptions, and those who did not understand the concept. The students' conception profile during the pretest can be seen in Figure 1.

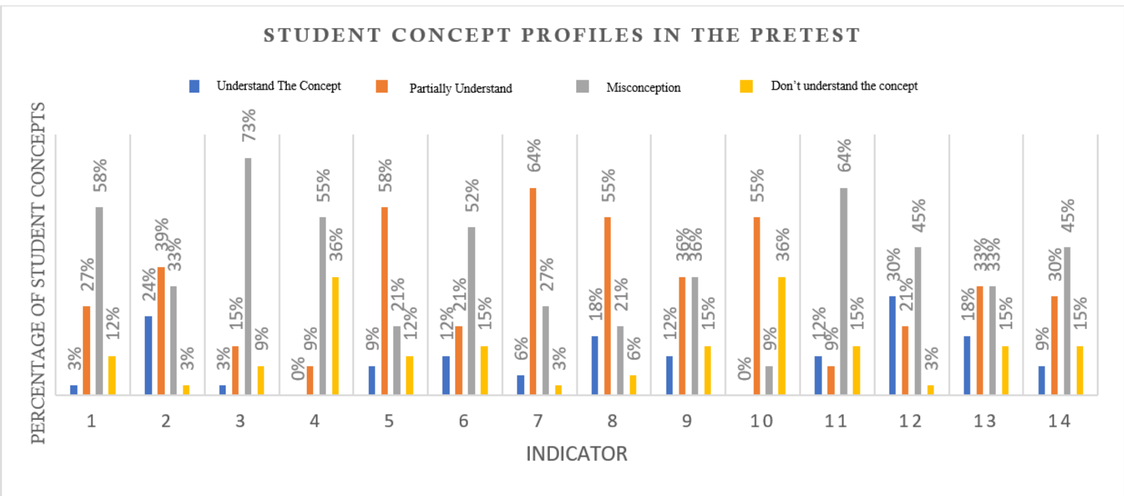

Figure 1. Students' Conception Profile in the Pretest

Figure 1 indicates that the highest percentage of students' conceptions falls into the category of misconceptions, with an average of 40.9%, followed by the partial understanding category with an average of 33.8%. The category of not understanding the concept is in the third position with an average of 14.1%, and the category of a good understanding of the concept is in the last position with an average of 11.3%. These results indicate that most students experience misconceptions. The misconceptions experienced by students based on the pretest results can be seen in Table 4.

Table 4. Profile of Misconceptions Simple Harmonic Motion

No	Misconceptions
1	Students believe that in one cycle of harmonic vibration, a particle covers a distance of 2A.
	Students think that the amplitude is equal to the distance covered in one cycle of harmonic vibration.
2	Students assume that when a particle is on the negative Y-axis, its position and velocity are always negative.
3	Students assume that the greater the horizontal distance between troughs or peaks, the larger the amplitude.
	Students believe that the more vibrations that occur in a given time, the lower the frequency.
4	Students mistakenly think that the mass of an object hanging on a spring does not affect its harmonic motion period.
5	Students believe that giving a pull to a pendulum bob will make it undergo harmonic motion.

No	Misconceptions
6	Students think that the higher the position of an object undergoing harmonic motion, the faster its period.
7	Students believe that increasing spring stretch reduces its total energy.
8	Students assume that increasing spring stretch reduces the maximum velocity.
9	Students think that increasing spring stretch reduces the maximum acceleration.
	Students believe that increasing spring stretch does not affect the maximum acceleration.
10	Students assume that acceleration in harmonic motion is zero when at x = A or y = A, as there is no harmonic motion.
11	Students think that increasing the spring constant reduces the vibration frequency.
12	Students believe that if the spring's potential energy is increased, while frequency and mass remain constant, the amplitude will remain the same.
13	Students assume that increasing the mass of an object is necessary for the maximum velocity in harmonic motion to increase.
14	Students believe that when the potential energy (EP) is equal to the kinetic energy (EK), the displacement that occurs is 2A.

The students were then subjected to a treatment involving the implementation of formative assessment with isomorphic problems accompanied by feedback to reduce misconceptions. The formative assessment provided was expected to remediate misconceptions and enhance the students' conceptions. Following this treatment, the students were administered a final test to determine the profile of their conceptions after the intervention. The profile of the students' conceptions posttest can be observed in Figure 2.

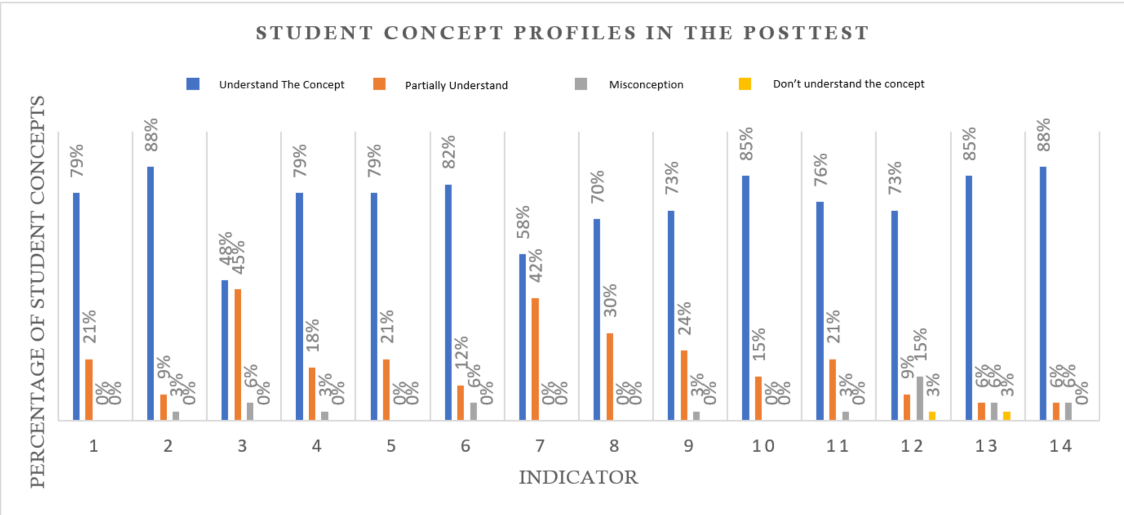

Figure 2. Profile of Student Conceptions in the Posttest

Figure 2 indicates that after the intervention, the percentage of students with a clear understanding of the concept is the highest, with an average of 75.8%. It is followed by the partially understood category, with an average of 20.1%. The misconceptions category is ranked third, with an average of 3.7%. Finally, the category of students who do not comprehend the concept is the lowest, with an average of 0.4%. These results indicate an improvement in students' conceptions, with a 64.5% increase in the percentage of students who fully understand the concept. This is followed by a 37.2% reduction in the percentage of students with misconceptions and a 13.7% reduction in the partially understood and not understood concept categories. Examples of student answers are presented in Figure 3.

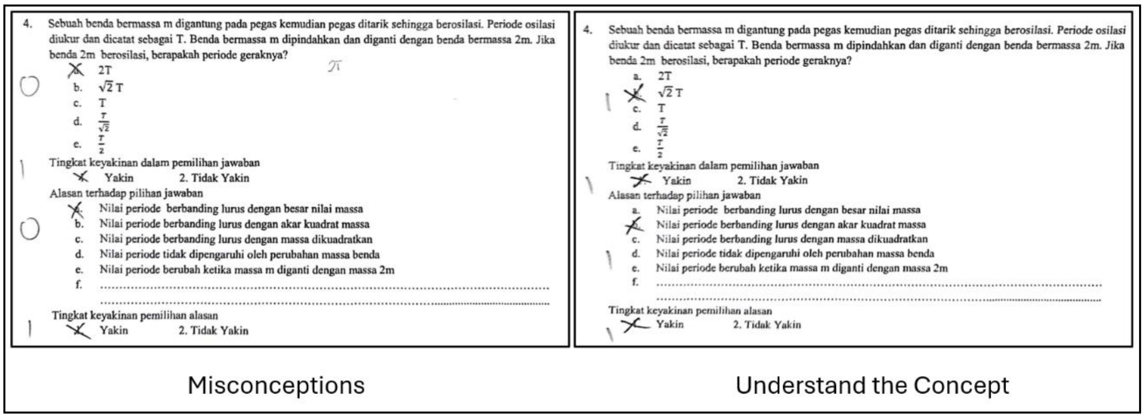

Figure 3. Examples Of Misconceptions and Understand the Concept Student Answers

3.2. McNemar Test

The McNemar test was used to determine the difference in misconceptions among students before and after the implementation of formative assessment based on isomorphic problems as an effort to reduce misconceptions in SHM. McNemar's Statistical Test was chosen because the pretest and posttest data were presented in ordinal data categorization. The McNemar Test results can be seen in Table 5.

Table 5. Results of the McNemar Test Analysis

No	A	B	C	D	p value	Conclusion
1	19	0	0	14	0,000	Significant
2	11	0	1	21	0,006	Significant
3	23	1	1	8	0,000	Significant
4	18	0	1	14	0,000	Significant
5	7	0	0	26	0,016	Significant
6	16	1	1	15	0,000	Significant
7	10	0	0	23	0,020	Significant
8	7	0	0	26	0,016	Significant
9	12	0	1	20	0,003	Significant
10	3	0	0	30	0,250	Not Significant
11	20	1	0	12	0,000	Significant
12	14	1	4	14	0,031	Significant
13	10	1	1	21	0,012	Significant
14	14	1	1	17	0,001	Significant

Table 5 indicated that after students received the treatment in the form of formative assessment based on isomorphic problems, there was a significant reduction in misconceptions among the students. This can be observed in the 13 indicators with a p-value < 0.05, confirming that Ha is accepted, signifying a significant difference in misconceptions among the students before and after the treatment using formative assessment based on isomorphic problems. Furthermore, only one indicator, number 10, had a p-value of 0.250 ($p \geq 0.05$), hence H0 is accepted, suggesting no significant difference in misconceptions among the students before and after the treatment using formative assessment based on isomorphic problems accompanied by feedback. Both results above indicate that the implementation of formative assessment based on isomorphic problems can effectively reduce misconceptions among the students.

3.3. Decreasing Quantity of Misconception (DQM)

Decreasing Quantity of Misconception (DQM) is an analysis used to determine the effectiveness of reducing or decreasing the quantity of misconceptions among students through formative assessment based on isomorphic problems. The results of the DQM test can be seen in Table 6.

Table 6. Results of the DQM Test Analysis

Indicator	DQM Value (%)	Category
1	100	High
2	91	High
3	92	High
4	94	High

Indicator	DQM Value (%)	Category
5	100	High
6	88	High
7	100	High
8	100	High
9	92	High
10	100	High
11	95	High
12	67	Moderate
13	82	High
14	87	High
Mean	92	High

Analysis of the DQM test shows a decrease in misconceptions after being treated with formative assessment based on isomorphic problems accompanied by feedback. The most significant decrease in misconceptions occurred in indicators 1, 5, 7, 8, and 10, amounting to 100%, falling into the "High" category (70%<DQM≤100%). The lowest decrease in misconceptions occurred in indicator 12, which decreased by 67% and falls into the "Moderate" category. The average decrease in misconceptions across all items was 92%, categorized as "High."

3.4. Paired sample t-test

A Paired sample t-test was used to determine the difference between students' conceptions before and after the implementation of formative assessment based on isomorphic problems. The analysis is conducted by comparing the average values of the pretest and posttest. The paired t-test has prerequisites that need to be met, which are data normality and homogeneity. Therefore, normality and homogeneity tests were conducted using IBM SPSS 25.

The normality test results indicate that the pretest data follows a normal distribution with a p-value of 0.231 ($p \geq 0.05$), while the posttest data does not follow a normal distribution with a p-value of 0.021 ($p < 0.05$). Subsequently, the homogeneity test results show that the data is homogeneous, with a p-value of 0.155 ($p \geq 0.05$). These results indicate that the data cannot be analyzed using the parametric paired t-test.

An alternative analysis was performed using the non-parametric Wilcoxon signed-rank test. The results of the test indicate that all students experienced an improvement in their conceptions, as evidenced by positive ranks for all 33 students. In other words, the entire sample experienced increased conceptions after the treatment with formative assessment based on isomorphic problems accompanied by feedback. The Wilcoxon test yielded a p-value of 0.000 ($p < 0.05$), indicating that Ha is accepted, meaning there is a significant difference between students' conceptions before and after the treatment using formative assessment based on isomorphic problems accompanied by feedback.

3.5. Discussion

The treatment in this study involved the use of formative assessment based on isomorphic problems with PowerPoint as the medium. The isomorphic problems in this study were employed as formative assessments. If students were unable to answer all three questions correctly, it indicates that they still had issues with understanding the concept. The follow-up involved providing feedback, which consisted of additional materials for students facing understanding issues and discussions to reinforce the understanding of students who had successfully answered all three questions. The provision of materials and discussions as follow-ups would clarify the understanding of students with misconceptions and strengthen the answers provided to students. Therefore, formative assessment based on isomorphic problems accompanied by feedback effectively reduced misconceptions among students in the SHM subject, with a "High" level of effectiveness. It is similar to the findings of Kusairi (2020) who found that the isomorphic test could help students to learn physics.

The success of isomorphic problems accompanied by feedback in improving students' conceptions can be observed in the comparison of conceptions' profiles before and after the treatment, indicating an increase of 64.5% in students with a good understanding of the concept, followed by a decrease in the number of misconceptions by 37.2%, partial understanding by 13.7%, and a lack of understanding by 13.7%. One of the questions that demonstrates the success of formative assessment accompanied by feedback in reducing misconceptions can be seen in the shift in students' conceptions in indicator 4, as presented in Table 7.

Table 7. Shift in Students' Conceptions 4th Indicator

Pretest	Posttest				Total
	UC	PU	M	NUC	
Understand the concept (UC)	0	0	0	0	0
Partially understanding (PU)	2	1	0	0	3
Misconceptions (M)	15	3	0	0	18
Not understand the concept (NUC)	9	2	1	0	12
Total	26	6	1	0	33

Students' conceptions during the pretest were primarily categorized as misconceptions, accounting for 55% (18 students). After the treatment involving formative assessment based on isomorphic problems accompanied by feedback, there was a significant shift in conceptions, with the majority falling into the category of having a good understanding of the concept, at 79% (26 students). Students with misconceptions believed that the mass of the object connected to a spring did not affect its harmonic motion's period. They failed to understand that the period of a spring's harmonic motion is directly proportional to the square root of its mass. In accordance with Tumanggor et al, (2020) findings, the misconception of simple harmonic motion occurs in the frequency sub topic with a percentage of 75%. The feedback provided in the formative assessment based on isomorphic problems with feedback for indicator 4 explained that the period is directly proportional to the square root of mass, which effectively corrected and improved the concept misunderstandings, thereby convincing students of the correct concept.

However, the posttest results still showed that some students fell into the category of partial understanding, amounting to 20.1%, with the highest percentage in Indicator 3 at 45%. Students in this category had a somewhat correct understanding but were not entirely comprehensive, meaning they still couldn't grasp some concepts fully. There were also instances of students having misconceptions, making up 3.7% of students, with the highest percentage occurring in Indicator 12. Students with misconceptions had high confidence in their answers, but their responses did not align with the underlying concepts. It is different from the findings of Grazziotin-Soares et al (2021) who found that students felt more confident with the correct answer and otherwise they experienced less confidence in misconception items. Furthermore, it is important to consider the relationship between the level of confidence with misconceptions because the more student's confidence with their answer, the more difficult to help them during their study in physics (Cyr & Anderson, 2013). Moreover, there were cases of students falling into the category of not understanding the concept, accounting for 3% in Indicators 12 and 13. Students who did not understand the concept couldn't answer questions correctly and lacked confidence in their responses.

The presence of students' conceptions deviating into partial understanding, misconceptions, and not understanding the concept could be attributed to various factors, including low responsibility. Farid & Aziz (2023) explain that the cultivation character of responsibility experienced various challenges such as the diverse character of students and the sense of responsibility in each individual is still low. Students lacked discipline, sportsmanship, adherence to rules, and commitment, and when given assignments for self-study using formative assessment based on isomorphic problems with feedback, they did not achieve optimal results, as indicated by deviations in their conceptions. Another reason is because misconceptions are resistant so that they are difficult to change and have been deeply rooted in certain concepts (Soeharto et al., 2019). This can strengthen Suprapto's (2020) opinion that misconceptions are a problem in all physics materials.

The McNemar test analysis showed that in 13 indicators, there was a significant difference in students' misconceptions before and after the treatment using formative assessment based on isomorphic problems with feedback. The students' misconceptions experienced significant changes after being exposed to formative assessment based on isomorphic problems with PowerPoint. This shift occurred because there was a transition from misconceptions to the correct understanding of the concept. This shift indicates that the misconceptions that occurred can be addressed and reduced by using formative assessment based on isomorphic problems with feedback. However, the results were different for Indicator 10, where there was no significant difference in students' misconceptions before and after the treatment using formative assessment based on isomorphic problems with feedback, as shown in Table 8.

Table 8. The Shift in Misconceptions 10th Indicator

Before Treatment	After Treatment	
	Not Misconceptions	Misconceptions
Misconception	3	0
Not Misconception	30	0

Table 8 shows that based on the pretest results, the percentage of student misconceptions is relatively low, at 9% (3 students). Thus, when subjected to treatment in the form of formative assessment using isomorphic problems accompanied by feedback, a shift from misconceptions to correct understanding occurs. This shift was experienced by all students who had misconceptions during the pretest. The McNemar test was conducted by comparing the difference in the proportion of student misconceptions before and after the treatment. Therefore, when the proportion of misconceptions in the pretest is low, and there is a change to a correct understanding, the resulting difference is not significant.

In addition to the McNemar test results that showed no significant difference in indicator 10, interesting results can also be observed in indicator 12, where the shift in misconceptions can be seen in Table 9.

Table 9. The Shift in Misconceptions 12th indicator

Before Treatment	After Treatment	
	Not Misconceptions	Misconceptions
Misconception	14	1
Not Misconception	14	4

Table 9 reveals that, surprisingly, after the treatment involving formative assessments based on isomorphic problems with feedback, there were four students who initially held correct understandings but later developed misconceptions. These students initially believed that when the energy within the spring system is increased, while the frequency and mass remain constant, the amplitude would increase. However, these students lacked confidence in their answers. Situations like this can occur during the learning process. Student uncertainty and misconception can lead to confusion when they receive feedback on the material from the treatment. Misconceptions that arise can result in confusion and resistance to corrections or specific exercises (Richey et al., 2019).

The McNemar test, as a whole, showed that there was a significant difference in student misconceptions after the implementation of formative assessments based on isomorphic problems with feedback. This is because Isomorphic and feedback can provide more accurate information about materials that have not been mastered (Kurniawan et al., 2021). Therefore, the feedback provided is more appropriate. These findings provide new insights to the general public as there is still a scarcity of similar research that addresses the effectiveness of isomorphic problems along with feedback in mitigating misconceptions.

Furthermore, the analysis of the Decreasing Quantity of Misconception (DQM) indicates that formative assessments based on isomorphic problems with feedback, implemented using PowerPoint, are capable of reducing misconceptions by 92% (in the "High" category) in total. This is detailed by observing a reduction in the "High" category across all 13 indicators, with only one indicator showing a reduction in the "Moderate" category. The reduction in misconceptions in the "Moderate" category is particularly observed in indicator 12. As discussed earlier, indicator 12 had the highest number of misconceptions during the posttest, so when compared to the pretest, the reduction falls into the "Moderate" category. After the treatment, students still exhibited misconceptions and misunderstandings when it came to understanding the relationship between changes in energy and amplitude when frequency and mass remain constant. The overall results of the DQM test strengthen previous research findings, such as those of Attaqie, which explained that posttest results for students who used computer-based formative assessments with isomorphic problems showed improvement, making it a practical method with potential for reducing student misconceptions(Attaqie, 2021). Research by Nuha et al. further supports these findings by suggesting that the use of web-based isomorphic problems with formative feedback provides enhanced understanding and effectively reduces student misconceptions since the experimental group achieved higher results compared to the control group (Nuha et al., 2017).

The analysis of Wilcoxon test data allows for the conclusion that there is a significant difference in students' conceptions following the implementation of formative assessments based on isomorphic problems using PowerPoint. The treatment can indeed influence students' understanding of the concept. This aligns with Kusairi (2020) who explained that the use of isomorphic questions can provide better feedback to identify achievement and improve learning quality. Another study by Sulistiyowati and her team also revealed differences in student learning outcomes after using isomorphic problems with web-based feedback (Sulistyowati et al., 2017).

4. Conclusion

The analysis of data pretest and posttest involving formative assessments based on isomorphic problems with feedback using PowerPoint has yielded the following results: 1) The McNemar test analysis indicates that among the 13 indicators, where the p-value is < 0.05, Ha is accepted, showing a significant difference in students' misconceptions before and after the treatment involving formative assessments based on isomorphic problems with feedback. Furthermore, for indicator number 10, a p-value of 0.250 ($p \geq 0.05$) is observed, leading to the acceptance of H0, indicating no significant difference in students' misconceptions before and after the treatment involving formative assessments based on isomorphic problems with feedback. 2) The Decreasing Quantity of Misconception (DQM) analysis shows a decrease in misconceptions with an average effectiveness rate of 92%, falling within the "High" category. 3) The Wilcoxon test analysis produces a p-value of 0.000 ($p < 0.05$), thereby accepting Ha, indicating a significant difference in students' conceptions before and after the treatment involving formative assessments based on isomorphic problems with feedback. In conclusion, this study demonstrates that formative assessments based on isomorphic problems with feedback using PowerPoint lead to significant reduction in misconceptions on the topic of Simple Harmonic Motion, with high effectiveness. Future research can analyze similar media with different materials and have various understanding problems. It is also important to increase the number of research samples to obtain more accurate results.

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