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Problem Solving Abilities of The Eliciting Activities Model Reviewed from *Wordwall* Assisted Cognitive Styles

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Abstract: Mathematical problem-solving skills are essential competencies in mathematics learning. This study examines these abilities through the application of the Model Eliciting Activities (MEAs) assisted by *Wordwall*. The research to analyze these abilities through the application of the Model Eliciting Activities (MEAs) supported by the use of *Wordwall*. This study uses a mixed method approach with a sequential explanatory design. The subjects of the study is students in grade X *SMAN* 6 Semarang. The quantitative approach is used to see the achievement of students' mathematical problem-solving skills, while the qualitative approach is used to analyze the thinking process of students in solving problems based on the cognitive styles of Field Independet (FI) and Field Dependent (FD). The results of qualitative research showed that (1) the completeness of students' mathematical problem-solving ability achieved classical completeness, (2) there was an increase in mathematical problem-solving ability after the treatment was given, (3) the increase in students' learning outcomes in the experimental group was higher than that of the control group. The results of qualitative research showed that students with the FI type were better than students with the FD type. Schools can utilize this research through the Model Eliciting Activities (MEAs) approach, supported by *Wordwall*, as an innovative teaching alternative to improve high school students' mathematical problem-solving skills.

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INTRODUCTION

Problem solving is a cognitive activity that involves the process of understanding the problem, processing and transforming the available information, to finding solutions even though the answer is not immediately visible (Mayer, 1992; Polya, 1985). Therefore, problem solving is more accurately seen as a thought process than just an end result. Through the process of problem-solving skills, students not only get answers, but also develop a more structured and in-depth way of thinking in dealing with various situations (Amalina & Vidákovich, 2023). Compared with solving ordinary or routine questions, troubleshooting involves using different approaches and requires new steps strategies (Rahmah et al., 2021). In the problem solving process, Polya (1985) said that students are said to be able to solve mathematical problems if they meet the indicators of problem-solving indicators, namely (1) students understand the given problem. (2) students find the relationship between the known data and the thing being asked. If the relationship has not been found directly, an auxiliary problem can be considered so that a resolution plan is obtained. (3) Implement the plan that has been prepared. (4) re-examine the solutions obtained. Students' ability to solve math problems is influenced by the characteristics of their thinking processes in understanding and processing the learning information they receive (Rahmah et al., 2021).

The ability of students in Indonesia to solve mathematical problems is still at a relatively low level, so it requires more optimal attention and handling. Based on the OECD (2023) report, the 2022 PISA results show that the mathematics achievement of Indonesian students aged 15 years is still ranked 70th out of 81 participating countries. This condition indicates that students' mathematical problem-solving competence still needs to be improved continuously (OECD, 2023). Based on the results of a preliminary study that has been conducted at Senior High School 6 Semarang on class X students, information was obtained that students' mathematical problem-solving skills are still relatively low with an average achievement of 49.8. The following are presented test questions given to students along with answers from one of the class X students at Senior High School 6 Semarang.

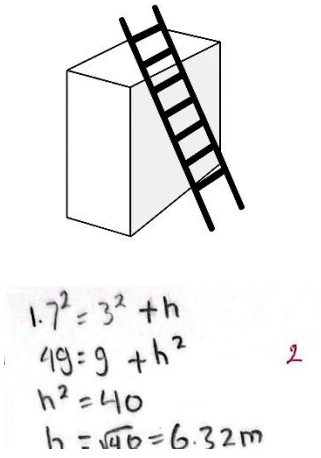

Figure 1. Answers to Students Problem Solving Skills

Based on Figure 1., the results show that most students have not been able to understand the problem in depth, plan the right solution strategy, and evaluate the results obtained. Students do not write down any information from the questions. The view of mathematical problem solving has long been put forward by Polya (1985), who explains that the process includes four important stages, namely understanding the problem, developing a solution plan, implementing the plan, and reviewing the results obtained. These four stages show that problem-solving is not only procedural, but also requires comprehensive, high-level thinking skills. Based on this, the learning applied needs to be contextual and be able to encourage the active involvement of students in the process of finding solutions. One relevant alternative is the implementation of Model Eliciting Activities (MEAs).

According to Lesh and Doerr (2013), this model plays a role in helping students construct mathematical models from real problems, as well as developing reflective and creative thinking skills in solving problems more meaningfully.

A form of effort to improve the quality of education and students' mathematical problem-solving ability is to consider the learning model. In line with the Chaiarwut et al. (2025) statement improvement in problem solving skills, it is carried out through learning design/model. The learning model offered is Model Eliciting Activities (MEAs). Effectiveness Model Eliciting Activities (MEAs) in mathematics learning has been supported by Chimmalee and Anupan (2022) research findings, which indicate that the application of the model is able to encourage the achievement of classical completeness in students' problem-solving abilities. In line with the study by Rusliah et al. (2021), which showed that students using the MEAs model were assessed as being more active than those who did not use the MEAs model. This shows that the use of MEAs has the potential to make a positive contribution to improving the quality of mathematics problem solving ability. One of the primary characteristics of MEAs is engaging students in constructing mathematical models (Irwan et al., 2018). Conceptually, MEAs are a learning model that is oriented towards developing understanding through mathematical modeling activities. MEAs provide space for students to build a more meaningful and applicable understanding. This approach is oriented to real-life contexts, implemented through small group work, and requires students to produce mathematical models as a representation of solutions to given problems (Qurotunnisa et al., 2025). Group learning activities give students the opportunity to share ideas, respond to their peers' opinions, and deepen their understanding through group discussions (Irwan et al., 2018). The MEA learning syntax includes: (1) the presentation of material with a problem-based approach heuristics; (2) the breakdown into simpler sub-problems; (3) identification of the parts of the problem; (4) identify the important components of the problem and connect the subproblems that have been obtained so as to form a structured solution; and (5) the selection of the right solution to solve the masalah (Suyatno, 2009).

Each learner has a different way of receiving and responding to information (Qoriyani & Widiyastuti, 2023). These differences arise because each individual has distinctive characteristics that distinguish them from other individuals. This characteristic is known as cognitive style. These variations in cognitive styles have implications for the difference in students' ability to think and reason ('Aisyah et al., 2021). Sternberg and Grigorenko (1997) argue that cognitive style is as a link between a person's intelligence and personality or a person's way of thinking. Witkin et al. (1977) classify cognitive styles into two main categories, namely Field Independent (FI) and Field Dependent (FD). Students with FI cognitive style tend to show independence in understanding and processing information. According to the results of the (Liu, 2018) study, students with FI cognitive style were able to respond to stimuli independently without relying on the help of educators, because they had a high level of independence. In contrast, students with FD cognitive styles showed different tendencies. They generally have difficulty in deciphering the simple parts of a complex problem. This is related to the way they process information globally, so they are more susceptible to being influenced by elements that are deceptive in the situation at hand (Alotaibi, 2024). Thus, it can be understood that students with the FD style tend to have a greater dependence on the environment and social interaction in their learning process.

According to Nenohai et al. (2022), *Wordwall* is one of the web based learning media that is designed interactively and it is able to create a fun learning atmosphere. The platform provides a wide selection of activity templates, such as matching, *quizzes*, word searches, pairing, word randomization, anagrams, and groupings, which can be used to adjust learning needs. *Wordwall* is a great learning medium and is recommended because it is an attractive platform and creates a supportive learning environment because there are good visual and audiovisual reminders. Abdillah et al. (2020) stated that *Wordwall* is an application that has various functions in learning, including as a learning medium, learning resources for teachers, assessment instruments, and educational game facilities for students. *Wordwall* helps students become more active during class (Widhiatama & Brameswari, 2024).

The problems that have been described earlier are the basis for the implementation of this research. The main focus of the research is directed at the analysis of the effectiveness of the application of the Model Eliciting Activities (MEAs) in developing students' mathematical problem-solving skills, taking into account differences in cognitive styles and the support of *Wordwall*-based learning media. This approach was chosen because mathematics learning is not only influenced by the models used, but also by the diverse cognitive characteristics of students. The advantage of this research lies in the effort to examine the relationship between the MEAs model, mathematical problem-solving ability, and cognitive style in an integrated unit. In addition, the use of *Wordwall* as an interactive learning medium is expected to strengthen the implementation of the MEAs model, so that the learning process becomes more interesting and meaningful for high school students. Practically, the results of this research are expected to contribute to educators in determining more adaptive and effective learning strategies. The application of the *Wordwall*-assisted MEAs model has the potential to be a relevant alternative in improving students' mathematical problem-solving skills, which ultimately has an impact on improving learning outcomes and achieving optimal mathematics learning goals, especially at the high school level.

METHODS

This study applies a mixed method approach that combines quantitative and qualitative data in a single research design unit. At the quantitative stage, the measurement was focused on the effectiveness of the application of the *Wordwall*-assisted Model Eliciting Activities (MEAs) model on students' mathematical problem-solving skills. Quantitative data was obtained through a problem-solving ability test, while the identification of cognitive styles was carried out using the GEFT (Group Embedded Figures Test) instrument. Furthermore, qualitative data was collected through interview techniques to obtain a deeper picture of the students' thinking process in solving mathematical problems. Qualitative analysis was carried out after students were classified based on GEFT results into two categories, namely field independent (FI) and field dependent (FD). The focus of the analysis is directed at the characteristics of each cognitive style in solving mathematical problems through MEAs-based learning. The students interviewed included 2 from the FI category and 2 from the FD category. This study used a sample consisting of all X grade students at SMAN 6 Semarang. The sample was selected using cluster random sampling, resulting in two randomly selected classes as the experimental and control groups. The research design used is sequential explanatory, where the quantitative stage is carried out first, then followed by the qualitative stage to strengthen and explain the results obtained previously. In addition, this study also uses a true experimental design with a pretest-posttest only control design pattern. The study involved two randomly selected classes, with each class acting as an experimental group and a control group.

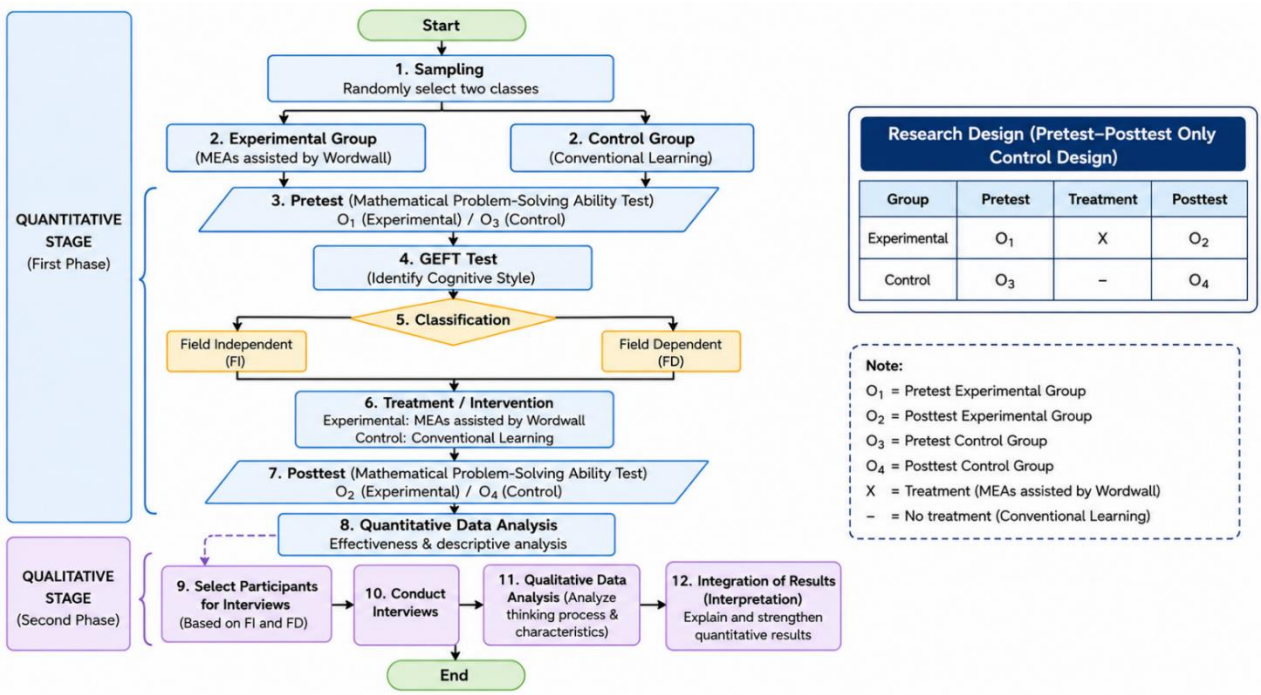

Figure 2. Flowchart of The Research Procedure

RESULTS

Quantitative data analysis

In this study, an effectiveness analysis was carried out by analyzing the initial and final data to answer the effectiveness of learning in the Model Eliciting Activities (MEAs) assisted by *Wordwall*. The data test was carried out by paying attention to the prerequisite tests, namely the normality test and the homogeneity test.

Table 1. Shapiro-Wilk Normality Test Results

Data	Sig	Remarks
Pretest experiments	0,110	normal
Posttest experiment	0,134	normal
Pretest control	0,075	normal
Pretest control	0,113	normal

Source: processed from research data, 2026

The results of the normality test in Table 1. showed that all variables tested, including posttest scores in the control and experimental classes, as well as pre in the control group, had a significance value above 0.05. This indicates that the research data meets the assumption of normality or is distributed normally.

Table 2. Homogeneity Test Results

Assessment Data	Significance Value	Levene Statistic	df1	df2	Remarks
Pretest experiments	0,743	0,108	1	68	normal
Posttest experiment	0,173	1,895	1	68	normal

Source: processed from research data, 2026

The results of the homogeneity test in Table 2. show that the problem-solving ability data has a homogeneous variance, which is indicated by a significance value greater than 0.05. With the assumption of normality and homogeneity met, the next analysis was carried out using parametric statistical tests to test the effectiveness of the data.

Initial data analysis

Initial data analysis was carried out to find out whether there was a difference in the average mathematical problem-solving ability between the control group and the experimental group based on the pretest results of each group.

Table 3. Independent Sample Test

Variabel	Mean Eksperimen	Mean Control	t	df	Sig. (2-tailed)
Pretest	71,643	72,500	0,320	68	0,750

Source: processed from research data, 2026

Test results independent samples in Table 3. shows the significance value of 0.750 >0.05, which indicates that it is accepted. These findings confirm that the average KPMM of students in the experimental and control groups did not differ significantly in the pretest stage. This condition shows that the initial abilities of the two groups are relatively balanced, making it worth comparing at a later stage.H_0

Table 4. Right-Party Proportional Test Results

		Data Groups	Lots of Data (N)	Proportion of Observation Results	Proporsi Hypothesis	Nilai Sig. (Exact)
Completeness	Experimental Group	Tuntas	36	1	0,75	0,000
	Total		36	1		

Source: processed from research data, 2026

The results of the binomial test in Table 4. show the value of *Exact Sig.* (1-tailed) of 0.000 which is below the significance limit of 0.05, so it is rejected. These findings indicate that the proportion of students who achieve completeness in mathematical problem-solving skills significantly exceeds 75%. Thus, the criteria of classical completeness can be declared to have been achieved.H_0

Table 5. Right-Party Paired T-Test Results

variabel	Mean Diff	t	df	sig	95%CI
Pre-Post	-17,2286	-7,853	34	0,000	-21,687; -12,770

Source: processed from research data, 2026

Test results paired t-test Table 5. shows the value $t(34) = -7.853$ with a significance level of 0.000 which is smaller than 0.05. This shows that there is a significant difference between pretest and posttest scores. This shows that the treatment provided contributes to improving students' mathematical problem-solving skills.

Table 6. Mann-Whitney U Test Problem Solving Test Results

	Groups	Number of Samples	Average Rating	Number of Ratings
Posttest	Eksperimen	35	41,81	1463,50
	Control	35	29,19	1021,50
	Total	35		

Source: processed from research data, 2026

The results of the analysis in Table 6. show that the average value of the rating (mean rank) posttest in the experimental group was 41.81 higher than the control group which obtained a score of 29.19. These findings indicate that the performance of students in the experimental group was better.

Table 7. Results of the Mann-Whitney U Test Problem Solving

	Posttest Results
Mann-WhitneyU	391,500
Wilcoxon W	1021,500
Z	-2,601
Asymp.Sig. (2-tailed)	0,009

Source: processed from research data, 2026

Test results Mann–Whitney to the value of N-Gain, based on Table 7., the value of Asymp is obtained. Sig. (2-tailed) is 0.009. Because the test was carried out by one party, the significance value became 0.0045 (< 0.05). In addition, the mean rank value of the experimental group (41.81) was higher than that of the control group (29.19). Thus, H_0 is rejected and it can be concluded that the increase in student learning outcomes in the experimental group is higher than in the control group.

Qualitative data analysis

This study began with the administration of the GEFT test to 31 students of class X of Senior High School 6 Semarang to identify cognitive style tendencies. The results showed that 11 students were classified *as field independent* (FI), while 20 others were field *dependent* (FD). The grouping is based on a score interval, which is 0–9 for the FD category and 10–18 for the FI category. Based on the results of this classification, further analysis is focused on the mathematical problem-solving abilities of students with FI cognitive style through test and interview data.

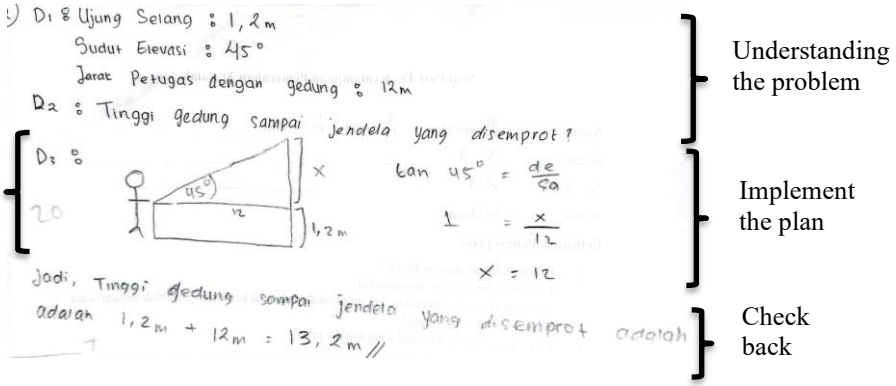

Figure 3. Field Independent Subject Test Results

Based on the test results, students with a field-independent cognitive style showed good ability to understand problems, namely by identifying and writing down information that was known and asked correctly. During the interview, the subject is able to re-explain the information clearly and concisely. Students also stated that the data available in the question was sufficient to be used in the completion process. At the planning stage, students develop strategies by determining relevant solutions to the given problems. The reasoning can be explained consistently when deepened through interviews.

In the plan implementation stage, the subject solves the problem according to the strategy that has been designed by utilizing spelling, the use of appropriate formulas, and systematic and accurate calculation steps. During the interview process, the subject showed no significant obstacles and was able to outline the settlement procedure in a structured manner. At the review stage, the subject writes the final result along with a conclusion that is in accordance with the problem. Students expressed their confidence in the correctness of the answers obtained and were able to re-submit the final conclusion appropriately.

The following are presented the results of test analysis and interviews related to mathematical problem-solving skills in students with *the Field Dendependent* cognitive style.

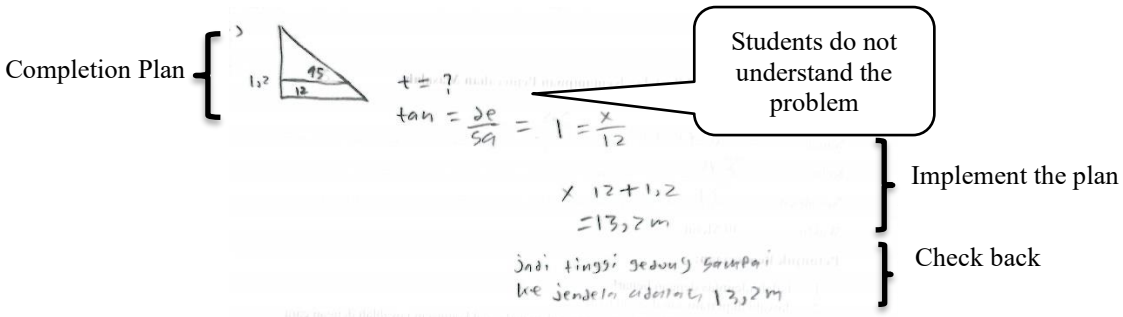

Figure 4. Field Dependant Subject Test Results

The results of the test analysis showed that students with field-dependent cognitive styles had difficulty in understanding the problem. This condition can be seen from the inability to identify known information and determine what is asked appropriately. At the time of the interview, the subject was also not able to re-describe these elements clearly and accurately. Nonetheless, the subject states that the information available in the problem is considered sufficient to be used in the solution. At the planning stage, the subject has not been able to formulate an appropriate strategy to solve the problem. Students do not prepare relevant arguments, and are not able to explain the solution plan when deepened through interviews.

In the implementation stage, the settlement is still not systematic and does not fully refer to structured steps. Students seem to experience obstacles during the interview process and have not been able to explain the completion procedure properly. At the review stage, students have not been able to present conclusions and final results completely and accurately. Nevertheless, students expressed confidence in the answers obtained, even though the explanation of the final conclusion was still unclear and not in accordance with the demands of the questions.

The model eliciting activities (MEAs) learning process supported by Wordwall

The Model Eliciting Activities (MEAs) learning process supported by *Wordwall* was conducted over three sessions. In each session, students were divided into 9 groups, each consisting of 4 students. *Wordwall* was used as a supporting tool to reinforce conceptual understanding and increase student engagement in the learning process. Learning activities were conducted using *Wordwall* as a tool to present questions and collect group answers. However, students were not merely asked to select or enter answers on *Wordwall*. Each group was also required to write down the complete and sequential steps of their solution on paper. This was done so that the students' thought processes and problem-solving strategies could be clearly identified. After obtaining the calculation results on their worksheets, students then entered their final answers into the *Wordwall* activity prepared by the teacher. The *Wordwall* links used for each session are as follows.

Session 1: https://wordwall.net/resource/115246338

Leaderboard

Rank	Name	Score	Time
1st	Kelompok 7	5	19:05
2nd	Kelompok 2	5	20:03
3rd	Kelompok 1	5	20:25
4th	Kelompok 6	5	20:29
5th	Kelompok 4	5	20:31
6th	Kelompok 3	3	16:34
7th	Kelompok 5	3	20:59
8th	Kelompok 9	3	22:04
9th	Kelompok 8	3	22:38

Figure 5. Students' Wordwall Assignments for Session 1

Based on the Figure 5., most groups were able to complete the questions successfully, the 9 groups that participated in the activity, 4 groups made mistakes on 2 questions, while the other 5

groups answered all questions correctly. These results indicate that the students were able to understand most of the material covered, although there were still some errors on specific questions that require a deeper understanding. Overall, the accuracy rate of the students' answers during the first session was relatively high.

Session 2: https://wordwall.net/resource/115247258

Leaderboard

Rank	Name	Score	Time
1st	Kelompok 3	4	18:33
2nd	Kelompok 1	4	19:05
3rd	kelompok 6	4	20:21
4th	kelompok 4	4	23:42
5th	Kelompok 9	4	23:42
6th	Kelompok 8	4	24:09
7th	kelompok 7	4	24:22
8th	kelompok 5	4	24:27
9th	Kelompok 2	2	19:25

Figure 6. Students' *Wordwall* Assignments for Session 2

The evaluation results showed an improvement compared to the first session, the 9 groups that participated in the activity, only 1 group made a mistake on 2 question, while the other 8 groups answered all questions correctly. These findings indicate that the students' understanding of the material has improved and that the number of errors was relatively low. The use of *Wordwall* also helped students receive immediate feedback, thereby reinforcing their understanding of the concepts being studied.

Session 3: https://wordwall.net/resource/100253561

Leaderboard

Rank	Name	Score	Time
1st	Kelompok3	4	11.2
2nd	Kelompok8(3,5,14,24)	4	25.0
3rd	Kelompok 1	4	1:10
4th	Tim naira	4	5:54
5th	Kelompok 7	4	18:45
6th	Kelompok 6	4	19:12
7th	Kelompok 9	4	19:24
8th	Kelompok 5	2	1:52
9th	Kelompok 2	2	19:41

Figure 7. Students' Wordwall Assignments for Session 3

Based on the Figure 7., most groups were able to complete the questions with a high level of accuracy, the 9 groups that participated in the activity, 2 groups made a mistake on 2 question and, while the other 7 groups answered all questions correctly. Although there was a slight increase in the number of errors compared to the second session, the results still indicate that most students have a good understanding of the material.

DISCUSSION

The effectiveness of the application of the *Wordwall*-assisted Model Eliciting Activities (MEAs) model in improving mathematical problem-solving ability is shown through three main indicators based on quantitative data analysis. Initial testing was carried out to ensure equality of ability between the experimental group and the control group by using an independent sample t-test on the pretest data. The test results showed a significance value of 0.750 (>0.05), indicating that there was no statistically significant difference between the two groups. Thus, the initial condition of

students in the two groups can be considered comparable, so that the results after treatment can be objectively compared.

Based on the results of the analysis, the proportion of students who achieved learning completeness in the experimental class was proven to be higher than the minimum limit set at 75%. The results of the proportional test showed a significance value of 0.000 (<0.05), which indicated that the achievement of classical completeness occurred significantly. The findings show that most of the students in the experimental class have achieved the criteria for completeness in this condition, indicating that the learning process applied is not only effective in improving learning outcomes, but also contributes to a deeper understanding of concepts. In addition, students become more directed in developing strategies for solving mathematical problems.

Based on the results of the analysis, the significance value obtained was 0.000 (<0.05) with an average difference of -17.2286 based on the results of the paired sample t-test. These results show that there is a significant difference between pretest and posttest scores in the experimental class. These differences indicate that there is an increase in mathematical problem-solving skills after students receive treatment using the *Wordwall*-assisted MEAs model.

Based on the results of the Mann–Whitney test, a significance value of 0.009 (2-tailed) or 0.0045 (one-tailed) was obtained which was smaller than 0.05, indicating a significant difference in increase between the two groups. The higher mean rank value in the experimental class (41.81) compared to the control class (29.19) further emphasized the superiority of the experimental group. Thus, the *Wordwall*-assisted MEAs learning model has been shown to be more effective in improving mathematical problem-solving skills compared to conventional approaches.

The theoretical explanation of the results of this study is related to the characteristics of the MEAs model which focuses on the mathematical modeling process and the active involvement of students. Through the learning stage, students are directed to identify problems, develop model representations, and test and revise the solutions obtained. This series of activities encourages the development of high-level thinking skills, especially in the aspects of problem understanding, strategy planning, and solution evaluation.

The use of *Wordwall* media also contributes to increasing student involvement during the learning process. This media allows the presentation of materials and practice questions interactively so that it can increase students' motivation and participation in learning activities. Through interactive and game-based activities, students become more active in exploring mathematical concepts and more motivated to solve the problems given.

In line with the results of previous research, the findings in this study show that the application of learning based on mathematical modeling activities can improve students' problem-solving skills. This is inseparable from the role of active involvement of students in solving contextual problems, which provides opportunities to build a deeper understanding of concepts and hone critical and analytical thinking skills.

The effectiveness of the application of *the Wordwall*-assisted Model Eliciting Activities (MEAs) model is reflected in the increase in students' mathematical problem-solving skills. The learning process that takes place not only results in a deeper understanding of concepts, but also forms a habit of systematic thinking in solving mathematical problems.

Problem-solving skills in students with a tendency to be field independent seem to develop optimally based on the results of answer analysis and interviews. They are not only able to solve contextual problems well, but also show mastery at every stage of solving. These findings reinforce the results of previous research, namely Rohmani et al. (2020) findings that put FI individuals in a relatively high ability category.

The ability to formulate strategies can be seen from the way students with a field-independent cognitive style organize information into variable forms. The representation is then processed into a simpler and more targeted solution model. This process shows the ability to reduce the complexity of the problem while formulating systematic solution steps. This supports the Influence and Endra et al. (2017) finding that FI individuals tend to be able to formulate fact-based plans and simplify problems.

In line with that, (Salsabila & Surya, 2025) was revealed that FI students were able to develop systematic strategies until the implementation stage.

The strategy implementation process shows that students with a tendency to *be field independent* are able to carry out completion steps consistently. A pre-designed strategy can be applied into the right procedure, accompanied by careful calculations. This indicates that the thought process carried out is not only structured, but also well controlled. This supports the Siahaan et al. (2018) finding that students with FI characteristics tend to be consistent in applying concepts and formulas and are able to carry out solution plans effectively in solving mathematical problems.

The reflective ability of students with a field-independent cognitive style was evident at the review stage. They do not only stop at obtaining answers, but actively re-check the correctness of the results, include reasons or proofs, and draw conclusions that are in harmony with the settlement process. This condition shows that the thought process carried out is controlled and systematic. Although some imperfections were found in the written answers, the results of the interviews revealed that the students still understood the completion flow in its entirety and were able to communicate it well. These findings confirm the results of a study (Mamonto et al., 2018) showing that students who tend to be field-independent are able to fully reflect on and reinterpret the results they obtain using their own words.

Mathematical problem-solving skills in students with a tendency to be field dependent have not shown optimal results when faced with contextual problems. This is reflected in the incomplete and inappropriate completion process, especially at the planning and review stages. This condition indicates that students have not been able to organize a comprehensive settlement strategy, so that it has an impact on the quality of the results obtained. This finding confirms the (Prabowo et al., 2019) results of the study that students with field-dependent characteristics are still not able to solve mathematical problems completely.

When viewed based on problem-solving indicators, FD students have not been able to complete all stages in their entirety. At the stage of understanding the problem, some students still experience confusion in dealing with contextual problems so that they are not able to identify the adequacy of data properly and are not used to writing down information that is known systematically. As a result, errors in understanding the problem have an impact on inaccuracies in the answers. This finding strengthens the results of previous research which revealed difficulties in interpreting mathematics problems in students with similar characteristics, namely in the characteristics of the field students still experience obstacles or difficulties (Rohmani et al., 2020).

At the implementation step, the suboptimal completion process reflects the limitations of students with a tendency to be field dependent in implementing the strategy that has been designed. Although in some parts the subject has chosen the right formula, the completion process cannot be completed correctly. In addition, the lack of precision in making calculations also contributes to errors in the final result. This result is in line with the opinion that the problem-solving process in students with a tendency to (Alifah et al., 2018) be field dependent has not taken place completely and systematically.

The results of students at the review stage have not shown adequate results. The conclusion is indeed written at the end of the settlement, but the content is not entirely accurate. This is due to the fact that the basis of calculation is still wrong, so the resulting conclusions do not reflect the correct answer. In addition, students have also not been able to conduct a thorough re-examination of the results obtained. This condition indicates that the verification process has not run optimally. These findings are in line with the Ginting and Nasution (2024) view that obstacles at the stage of formulating conclusions and verifying answers show that students with field-dependent cognitive styles still experience limitations in proving the information used appropriately.

From the description above, it shows that the differences in behavioral characteristics between students with field independent (FI) and field dependent (FD) cognitive styles are evident during the problem solving process. FI learners tend to show a high level of concentration. They are more focused, work independently, and are not easily influenced by activities in the surrounding environment. This attitude reflects good self-control in the learning process. These findings are in

line with the opinion of Rohmani et al. (2020) that individuals with FI tendencies are able to maintain concentration and work without relying on external conditions. In contrast, students with FD cognitive style showed a pattern of behavior that was less stable in maintaining focus. Higher anxiety levels are seen during the process. In addition, they tend to interact more often with peers and occasionally distract themselves from the situation around them. This social involvement shows that FD students are more dependent on the environment in completing tasks. This condition indicates that the ability to maintain concentration in FD students is not optimal. Overall, the results of this study show a significant difference in contextual mathematical problem-solving ability. Students with FI cognitive style showed superior performance compared to FD-style students.

During the three-session learning process, the high percentage of correct answers in the *Wordwall* activity indicates that this medium is effective in helping students take an active role in understanding the concepts being taught. These findings suggest that *Wordwall* is an engaging and interactive medium that can enhance student engagement and understanding during the learning process.

CONCLUSION

This study conclude that the MEAs model supported by *Wordwall* is effective in improving students' mathematical problem-solving skills. After the implementation of the learning model, the experimental class showed higher improvement and achieved classical completeness. The effectiveness of this model is related to its learning process. The integration of MEAs and *Wordwall* encourages active engagement and provides meaningful problem situations. This helps students understand problems, develop solution strategies, and evaluate their answers, which are key aspects of problem-solving skills.

From the cognitive styles perspective, the results show that students with a field-independent (FI) style improve more optimally because they can work systematically and independently. In contrast, students with a field-dependent (FD) style still face difficulties, especially in planning and evaluating solutions. This shows that the effectiveness of the model is influenced by students' cognitive characteristics. The implications of these findings are that teachers should apply the *Wordwall*-assisted MEAs model to improve students' problem-solving skills, but also need to adjust their teaching strategies based on cognitive styles. Teachers should provide more structured guidance and step-by-step support for FD students, while giving more independent learning opportunities for FI students. In addition, *Wordwall* should be used not only to increase engagement but also to support differentiated instruction. Therefore, combining MEAs with adaptive teaching strategies can enhance the effectiveness of mathematics learning and improve students' problem-solving skills more comprehensively.

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