**Kontinu: Jurnal Penelitian Didaktik Matematika**
**E-ISSN: 2656-5544**
**P-ISSN: 2715-7326**
**Vol. 8, No. 2: November 2024**
**Hal. 187-202**

# Improving Students' *Mental Health* Through Self-efficacy in Solving Algebraic Form Problems Using the Mentorika Application

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***Abstract.*** *In today's increasingly complex life situations, mental health problems can increase, especially among students in Indonesia. Mental health problems that occur in students are related to Self-efficacy regarding the potential they have in achieving something and in dealing with pressure in certain situations. Low Self-efficacy in adolescents can cause emotional and mental disorders. Based on this, this study aims to develop a mentor application to help improve students' mental health through Self-efficacy in solving algebraic form problems. This research was conducted at SMP Negeri 2 Kedungtuban, and the subjects of this study were 30 seventh-grade junior high school students. The research method used is Research and Development (R&D), and the ADDIE Model design is used. The results of data analysis show that the mentorika application is proven to be valid because it has a significant level of 0.000 < 0.005, feasible because all variables (statements) have a value of r count > r table, and effective because it meets the individual completeness test and classical completeness test, so it can be said that the mentorika application developed is effective in improving students' mental health through Self-efficacy in solving algebraic form problems. The evaluation results show that the effect of student confidence on improving mental health in solving algebraic form problems has increased significantly after using the Mentorika application.*

***Keywords:*** *Mental Health, Self-Efficacy, Algebraic Forms.*

## INTRODUCTION

Education is a critical aspect of the formation of the individual. Math is often considered a mentally challenging subject. Students often experience stress and anxiety in facing assignments or exams that can affect their overall mental well-being. Mental health has an important meaning in a person's life; with a healthy mentality, a person can carry out activities as a living being (Sari et al., 2020). Factors such as a lack of self-efficacy in solving math problems can be the main cause of high levels of anxiety.

The importance of students' mental well-being as part of the educational experience is increasingly recognized. Positive mental health contributes to an increase in subjective happiness in a person. It is related to a longer life expectancy because of a lower chance of contracting the disease and better recovery if a person experiences a bad situation (Ningrum & Amna, 2020). Improving students' mental well-being includes understanding and mastery of subject matter, managing stress, increasing confidence, and developing psychosocial skills.

Good mental well-being will support a more effective and enjoyable learning process for students. One of the factors that can contribute positively to improving students' mental health is self-efficacy, which is the individual's confidence in completing tasks or facing problems. Self-efficacy does not measure how much a student has abilities but rather a belief in what can be achieved with the abilities that exist in various situations (Walidaina & Hidayat, 2024). When students can overcome challenges in subjects such as maths, this can increase their motivation to study and, ultimately, positively impact their mental well-being. This research focuses on algebraic forms.

Algebraic forms are mathematical forms that contain an alphabet of unknown value. Algebraic forms can be used to solve cases in everyday life. Algebraic form operations are a prerequisite for the next material, so it is mandatory for students in grade VII of junior high school (Mauliandri & Kartini, 2020). According to (Sundari & Wulantina, 2022), the common difficulty students face when solving algebraic form operation problems is difficulty defining and determining what variables, constants, and coefficients are. Students also struggle to apply basic algebraic operations, such as addition, subtraction, multiplication, and division.

The Mentorika application was developed to improve students' mental health through self-efficacy in solving algebraic form problems. Mentorika is an application that integrates PowerPoint, iSpring Suite, and APK Builder. The name "Mentorika" comes from the word "mentor," which emphasizes the learning and guidance aspects, and "Ika," which reflects an interactive and modern feel. Thus, Mentorika presents a positive approach to mathematics learning while playing a role in building students' confidence and mental well-being.

As a solution to these problems, using the Mentorika application is expected to improve students' mental health by strengthening self-efficacy in solving algebraic form problems. The main focus of this development is to build students' confidence in the context of mathematics so that it can contribute significantly to a more holistic and sustainable education. In addition, the use of technology in the Mentorika application is expected to create a more inclusive and supportive learning environment for all students.

## RESEARCH METHODS

The type of research used in this research is research and development (Research and Development), which aims to develop a product and then evaluate the trials of the product (Cholifah et al., 2021). In this research, learning media in the form of a Mentorika-based application will be developed in Android using algebraic form material. This research and development applies the ADDIE model, which consists of Analysis (Analysis), Design (design), Development (development), Implementation (implementation), and Evaluation (evaluation) (Sugiyono, 2020).

Based on the opinion of Sugiyono (2020), the stages used by the ADDIE model are as follows:

1. Analysis Stage

   This analysis stage was conducted to discover what is related to developing the Mentorika application, which aims to improve students' mental health through self-efficacy in solving algebraic form problems. The analysis stage carried out in this research consists of 2 stages, namely:

   a. Performance Analysis

      The performance analysis was carried out by observation and interviews with mathematics teachers in grade VII of SMP Negeri 2 Kedungtuban, which aimed to discover the learning process and the student activities during learning. This performance analysis is useful in finding out if there are problems in the performance of the learning process so that solutions can be found to the problem.

b. Need Analysis

The needs analysis carried out aims to find out the needs of students during learning. This Analysis was carried out to find out what kind of learning media is following the needs of students at SMP Negeri 2 Kedungtuban.

2. Design Stage
   a. Product design design: the researcher will start designing learning product designs with concepts according to the agreed learning materials and objectives.
   b. Preparation of questions, materials, and answers from algebraic form materials.
   c. Prepare a product assessment instrument, namely a questionnaire intended for material experts, media experts, and students as the target of product implementation.
3. Development Stage
   a. Product manufacturing is based on the design of the product that has been designed.
   b. Validation: at this stage, subject matter experts and media experts validate the initial product. The validation results are used as a basis for revising the developed product.
   c. Revision I
4. Implementation Stage

   This stage is to implement or use the development of the Mentorika application, which is used to help improve students' mental health through self-efficacy, which has gone through various stages before. Implementation is carried out in schools with student subjects. The media trial to see the students' responses was aimed at small groups. In the experiment using the Mentorika application, it is hoped that it can interest students and make it easy to understand algebraic form material.
5. Evaluation Stage

   After the implementation steps of the Mentorika application, a media product must be evaluated to find out what needs to be added or changed to suit the

needs of students. The evaluation was obtained from input and suggestions from educators and students who had carried out the implementation stages. The evaluation in this study was improved from the results of the media validation questionnaire and the results of lecturer guidance. Based on several sources, the improvement aims to create learning media products that suit the needs of students and teachers in the learning process.

The subjects in this research were 30 grade VII students of SMP Negeri 2 Kedungtuban, Blora Regency. The object of this research is a learning medium in the form of an android-based mentoring application on algebraic form material to improve students' mental health through self-efficacy.

The data collection technique in this research uses three types of questionnaires: expert validation questionnaires, teacher and student response questionnaires, and self-efficacy questionnaires before and after using the mentoring application. The Expert Validation Questionnaire was used to obtain a validity assessment from a team of experts regarding the developed learning media, with the test subjects being one material expert and one media expert, who are UNISSULA mathematics lecturers. Teacher and student response questionnaires determine the feasibility and practicality of learning media products. The self-efficacy questionnaire was used to determine the effectiveness of learning media products by using several statements based on the dimension of self-efficacy in improving students' mental health when solving algebraic form problems.

The data analysis techniques in this research include three types of tests: validity, practicality, and effectiveness. First, the validity test analysis used data from a questionnaire of material and media experts with a Likert scale, where the assessment was converted into quantitative data with a score of 1 to 4. Second, the practicality test analysis used teacher and student response data measured by the Guttman scale, where the answer "yes" got a score of 1 and "no" got a score of 0, and the statement data was converted into quantitative data. Third, the effectiveness test analysis was carried out by measuring the results of self-efficacy questionnaires before and after using the Mentorika application, using a Likert scale with five options: SL (always), SR (often), KD (sometimes), JR (rarely), TP (never). In

positive statements, SL was given a score of 5, SR 4, KD 3, JR 2, and TP 1, while in negative statements, SL was given a score of 1, SR 2, KD 3, JR 4, and TP 5. This data was analyzed using the Paired Sample T-Test to compare pre-test and post-test results, as well as an analysis of score improvement from each dimension of self-efficacy.

## RESULTS AND DISCUSSION

### 1. Validity Test Analysis

This validity test uses a media expert validation sheet and a material expert validation sheet. The assessment is calculated based on the lift that has been filled. Assessments of all aspects are summed up to determine the level of valid criteria. The validity criteria can be analyzed using the following percentage equation formula:

$$P = \frac{f}{n} \times 100\%$$

Information:

P: Percentage of data

f: Total score acquisition

n : Maximum score

The validity criteria using the Likert scale obtained in conducting the Analysis of the validity test of the use of the developed media are:

**Table 1. Validity Test Criteria**

| Percentage (%) | Validity Criteria | Information |
|---|---|---|
| 90 – 100 | Very valid | No revision required |
| 75 – 89 | Valid | No revision required |
| 65 – 74 | Quite valid | Need for revision |
| 55 – 64 | Invalid | Need for revision |
| 0 – 54 | Invalid | Total revision |

a. Material Expert Analysis

**Table 2. Results of the Material Expert Questionnaire Calculation**

| Total Score | Maximum Score Amount | Validity (%) |
|---|---|---|
| 89 | 100 | 89% |

Based on the results of the calculation of the material expert questionnaire, the Mentorika application obtained a score of 89%, which is included in the

category of valid and does not need revision (range 75–89%). It is supported by the suitability of the material with the curriculum standards, where the application content is considered relevant to the basic competencies and expected learning objectives. In addition, the materials are designed to meet the needs of students by involving supporting media such as illustrations, quizzes, and games that are engaging and help with the learning process. The application uses clear rules and effective language in terms of language and presentation. In contrast, the presentation is systematic and communicative, which makes it easier for students to understand the material. By meeting all aspects of eligibility, the application is declared suitable for use without further revision.

b. Media Expert Analysis

**Table 3. Results of Media Expert Questionnaire Calculation**

| Total Score | Maximum Score Amount | Validity (%) |
|---|---|---|
| 85 | 92 | 92,39% |

Based on the results of the validation of media experts, the Mentorika application obtained a validity rate of **92.39%,** which is included in the range **of 90–100**. Thus, the Mentorika app is categorized as **"very valid."** However, before it can be used directly, media experts provide several improvement notes, such as re-checking the navigation buttons to work properly in all parts of the app, adding explanations to the material to make it more informative, and including the profile of the app creator to introduce the team or individuals who contributed to its development. After the repairs were made according to these records, the Mentorika application was declared ready for use and had a very high level of validity.

**2. Practicality Test Analysis**

The practicality test was carried out using the average score of the student response questionnaire and the average score of the teacher's response questionnaire. The assessment is calculated based on the filled-out questionnaire. Assessments of all aspects are summed up to determine the level of practice criteria. It can be analyzed using the following percentage equation formula to determine the practicality criteria.

$$P = \frac{f}{n} \times 100\%$$

Information:

P : Percentage of data

f : Total score

N : Maximum score

The practicality criteria based on the Likert scale obtained in conducting a practical test analysis of the use of the Mentorika application are as follows:

**Table 4. Practicality Test Criteria**

| Percentage (%) | Practicality Criteria |
|---|---|
| $0\% \leq y \leq 20\%$ | Impractical |
| $20\% < y \leq 40\%$ | Less practical |
| $40\% < y \leq 60\%$ | Quite practical |
| $60\% < y \leq 80\%$ | Practical |
| $80\% < y \leq 100\%$ | Very practical |

a. Teacher Response Analysis

Based on the teacher's response questionnaire answers, the average total score of each statement is 1 and 0, with an average maximum score of 1. So, a total percentage of 88.23% was obtained and was included in the range of 75 – 89, so the Mentorika application was included in the category of "practical and does not need revision." The app already uses an easy-to-understand language, attractive display, and animations. In addition, this application can increase enthusiasm and motivation for learning. The material presented is regular, and the evaluation questions are in accordance with the learning material to help remember the material.

b. Student Response Analysis

Based on the answers to the student response questionnaire, the average total score of each statement is 9 and 10, with an average score of 10. So, 97.64% was obtained and included in the range of 90 – 100, so the Mentorika application was included in the category of "very practical and does not need revision." This application allows students to face difficulties in learning. Students can do well in math, especially in algebraic materials. Students can understand every material or

assignment of algebraic form problems, and they do not feel burdened with many tasks. Students feel confident that there is a solution to every algebraic form problem.

**3. Effectiveness Test Analysis**

Questionnaire instruments for self-efficacy used before and after using the Mentorika application have been proven valid and reliable based on tests with a sample of 30 people. Understanding the objectives of this research, which focuses on improving students' Mental Health through self-efficacy in solving algebraic form problems using the Mentorika application, data analysis from the questionnaire was carried out, and self-efficacy was given to participants before and after the intervention. The first step is performing a normality test to ensure the data is distributed normally, a prerequisite for advanced statistical testing. After that, a paired sample t-test was conducted to compare the average self-efficacy before and after using the Mentorika application to see significant differences. In addition, the data is analyzed based on the dimensions of self-efficacy. Bandura (in Fajar and Aviani, 2022) explains that self-efficacy consists of Magnitude, Strength, and Generality. Magnitude is related to the level of confidence an individual has to face a task based on the difficulty level of the task. In the General, it is related to the breadth of the scope of expertise possessed by individuals in various fields. Meanwhile, strength is related to beliefs about individuals' self-strength or self-potentiality. The results of this Analysis will provide an idea of whether using the Mentorika application has succeeded in improving students' self-efficacy as a whole and on each dimension, as well as their impact on Mental Health.

a. Normality Test

**Table 5. Normality Test**

| | **Group** | **Shapiro-Wilk** | | |
|---|---|---|---|---|
| | | Statistics | Df | Sig. |
| **Test results** | Pre-test | ,980 | 30 | ,823 |
| | Post-test | ,943 | 30 | ,112 |

Based on the table above using the Shapiro-Wilk test, the Sig is known. The pre-test value is 0.823, and the post-test value is 0.112. Because the value is greater than 0.05, it can be concluded that the pre-test and post-test value data are

distributed normally. So, the requirements for using the paired sample t-test have been met.

b. Paired sample t-test

**Table 6. Paired sample t-test**

| | | Paired Differences | | | t | Df | Sig.(2-tailed) |
|---|---|---|---|---|---|---|---|
| | | Mean | Std.Deviation | Std. Error Mean | | | |
| Pair 1 | PreTest – PostTest | -7,967 | 10,682 | 1,950 | -4,085 | 29 | ,000 |

Based on the paired sample t-test above, it is known that the Sig (2-tailed) value is 0.000 < 0.05, so it can be concluded that there is an average difference between the pre-test and post-test so that there is an effect of the use of mentoring applications on students' self-efficacy when solving algebraic form problems.

These findings align with a study by Zhang (2022), which found that improved student mind dynamics, online interaction, self-assessment, academic knowledge, and positive affectivity can improve students' self-efficacy. The features of this app significantly improve students' self-efficacy. Stated that competency indicators are a benchmark for KD achievement. "Competency Indicators" help students set and understand learning goals, boosting their confidence. Learning mathematics with an understanding of concept maps allows students to actively participate in connecting concepts related to the information they are learning Mauliandri et al. (2021) (Ratna Suminar, 2022). "Concept Maps" visualize the relationships between algebraic topics, clarify the material's structure, and reinforce students' understanding. "Math Figures" provides a historical context that motivates and inspires students. "Structured Materials" and "Quizzes with Live Feedback" allow students to evaluate and improve their comprehension quickly. When playing educational games, students can learn various things while getting their entertainment while playing (Handican et al., 2023). "Educational Games" make learning more interactive and fun, while "Background Music" creates a comfortable learning atmosphere, reduces anxiety, and improves students' focus. The method of using music is proven to bring calmness, comfort, emotional control, the development of spiritual and moral aspects, and a feeling of relaxation (Suci, 2023).

c. Based on the Dimension of Self-efficacy

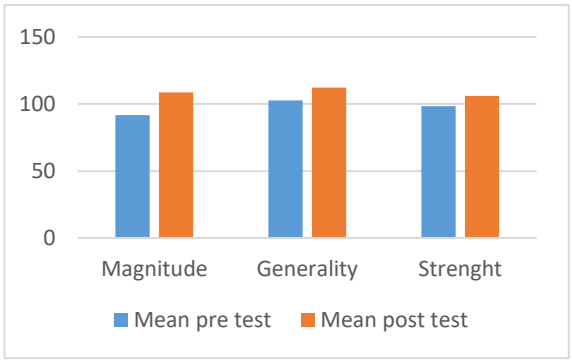


**Figure 1. Self-efficacy Dimension Mean Change Diagram**

The bar chart above shows the average change in pre-test and post-test results based on the dimension of self-efficacy. Magnitude (level) increased by 18%, generality (generalization) increased by 9%, and strength (strength) increased by 8%.

**Table 7. Self-efficacy Dimension Analysis**

| **Dimension** | **Calculated Average (%)** | |
|---|---|---|
| | Pre-Test | Post Test |
| Magnitude | 61,17 | 72,42 |
| General | 68,44 | 74,89 |
| Stern. | 65,67 | 70,78 |
| | 65,09 | 72,69 |
| **Overall Average** | **68,89** | |

This research showed a significant increase in student self-efficacy after the intervention, which was reflected in the average change in the dimensions of magnitude, generality, and strength from the pre-test to the post-test. Arifin stated that self-efficacy refers to belief in a person's ability to achieve the desired performance. In mathematics, self-efficacy refers to certain circumstances or problems of students' confidence in completing various tasks and problems (Ratnawati et al., 2022). magnitude dimension, the average pre-test of 61.17% indicates self-efficacy, which is relatively low and below the threshold of 68.89%. After the intervention, this Average increased to 72.42%, exceeding the threshold and showing a change in a positive direction. The same thing happened in the generality dimension, where the average pre-test of 68.44% was also below the

threshold of 68.89% but increased significantly to 74.89% after the intervention. In the Strength dimension, the average pre-test of 65.67% also increased to 70.78% after the intervention. The overall average increase from 65.09% in the pre-test to 72.69% in the post-test indicates a significant increase in overall self-efficacy.

This improvement reflects the positive impact of the interventions implemented. Self-efficacy directly affects the following things: behavioral choices, motivation to try, resilience, a supportive mindset, and the ability to deal with stress (Widiyanto in Taufik & Komar, 2022) .

Higher self-efficacy indicates that students feel more confident in coping with various challenges, potentially reducing stress levels and improving their emotional, psychological, and social well-being. Self-efficacy, which reflects an individual's belief in his or her ability to succeed in a particular task or situation, has been shown to affect mental health positively. This research proves that increased self-efficacy is closely related to improved students' mental health, which aligns with previous research results.

These findings align with a study by Sisliana et al. (2023) that showed a significant relationship between self-efficacy and adolescent mental health. Sisliana et al.'s research emphasizes that self-efficacy positively impacts adolescent mental well-being, suggesting that increased self-efficacy can contribute to improved mental health. Sisliana et al. also noted that increased self-efficacy helps adolescents cope with daily challenges, which is consistent with the results of this research, which shows that interventions that successfully improve students' self-efficacy also positively impact their mental health.

An educational application is software developed to support learning, teaching, and daily tasks. In addition, this research supports the finding that educational applications such as Mentorika can play an important role in improving student (Risyah et al., 2023) self-efficacy. This app, which is used to solve algebraic problems, has proven to improve students' self-efficacy, as shown by the increase in average self-efficacy after using the app. It underscores the importance of integrating technology in education to support the development of self-efficacy and, in turn, students' mental health.

Overall, the results of this research confirm that interventions designed to improve self-efficacy can provide significant benefits for students' mental health. Sukatin et al. (2023) stated that high self-efficacy strengthens an individual's confidence in his or her ability to achieve learning goals, while good emotional stability helps maintain the focus, perseverance, and motivation required in the learning process. Increased self-efficacy not only helps students feel better prepared to face academic challenges, but it can also improve their emotional and psychological well-being and support overall mental health. This research shows that strategies that integrate increased self-efficacy, such as using educational apps, can effectively support students' mental health.

The study results show that the application of Mentorika can significantly improve students' self-efficacy, which positively impacts students' mental health. However, some limitations in implementing this research need to be considered. First, the limited number of respondents, which involves only 30 grade VII students in one school, can affect the generalization of the research results. For further research, it is recommended to involve a larger and more diverse sample so that the results can be more representative of the general student population.

Second, testing conditions, such as limited trial time and possible differences in students' comfort levels with technology, can also affect the study results. Some students may take longer to adapt to the Mentorika application, so the results obtained may not fully reflect the maximum potential of the application.

Third, external factors such as teacher support, school facilities, and learning environment are also challenges that affect the effectiveness of the application. In this study, the application was carried out under the researcher's supervision, so the results obtained may be different if applied directly in the daily learning environment without intensive supervision.

## CONCLUSION

Based on the study's results, the Mentorika application has proven valid and practical as a mathematics learning medium for grade VII junior high school students. Material experts validated the results with a score of 89%, a valid category

without needing revision. In comparison, validation by media experts resulted in a score of 92.39%, which is categorized as very valid with some minor improvement suggestions. The teacher and student responses were also positive, with a practicality percentage of 88.23% and 97.64%, respectively, indicating that the application is practical and does not require revision. In addition, effectiveness tests showed that using the Mentorika app significantly improved students' self-efficacy in solving algebraic problems, positively impacting their mental health. It is evidenced by positive changes in the dimensions of magnitude, generality, and strength from the pre-test to the post-test. An increase in average self-efficacy, both overall and in specific dimensions, suggests that students feel more confident in overcoming challenges. It can potentially reduce stress and improve students' emotional and psychological well-being. These findings are consistent with previous studies that have shown a positive link between self-efficacy and mental health, as well as confirming that educational applications such as mentoring can effectively support improved self-efficacy and students' mental health. Thus, the Mentorika application can be used as a learning tool to improve students' self-efficacy and mental health in algebra learning.

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