



Development of E-Modules Based on the Socrates Method to Improve Learning Outcomes of Madrasah Ibtidaiyah Students in Mathematics Subjects

Pengembangan E-Modul Berbasis Metode Socrates Untuk Meningkatkan Hasil Belajar Siswa Madrasah Ibtidaiyah Pada Mata Pelajaran Matematika

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Abstract

This research aims to develop e-module based on the Socratic method. This research is research and development. This research uses the ADDIE development model, including analyze, design, develop, implement, and evaluate. This research only reached the implementation stage. The research was carried out in MIS AL Hidayah Sidomulyo. The research subjects were 20 class V students, consisting of 9 male students and 11 female students. The research object is an e-module based on the Socratic method to improve student learning outcomes. Data collection techniques are observation, tests and questionnaires. The data analysis techniques used are: (a) e-module analysis based on the Socratic method; (b) the effectiveness of e-modules based on the Socratic method. Based on validation results by media experts with a percentage of 94.85%, it is categorized as very feasible. The results of validation by material with a percentage of 94.65% are categorized as very feasible. Meanwhile, validation results by language with a percentage of 89.75% are categorized as very feasible. The results of the pretest trial were with a percentage of 45% with 3 students who completed it and 17 students who did not complete it. Meanwhile, the posttest trial had a percentage of 83.5% with 19 students who completed and 1 student who did not complete. It can be concluded that the e-module based on the Socratic method is feasible and effective to use.

Keywords: e-module; Socratic method; mathematics; learning outcomes

Abstrak

Penelitian ini bertujuan untuk mengembangkan e-modul berbasis metode Socrates. Penelitian ini merupakan penelitian dan pengembangan (Research and Development). Penelitian ini menggunakan model pengembangan ADDIE, diantaranya yaitu analyze, design, develop, implementation, dan evaluate. Penelitian ini hanya sampai pada tahap implementation. Penelitian dilaksanakan di MIS AL Hidayah Sidomulyo. Subjek penelitian yaitu peserta didik kelas V yang berjumlah 20 peserta didik, yang terdiri dari 9 peserta didik laki-laki dan 11 peserta didik perempuan. Objek penelitian yaitu e-modul berbasis metode Socrates untuk meningkatkan hasil belajar peserta didik. Teknik pengumpulan data yaitu observasi, tes, dan angket. Teknik analisis data yang

digunakan yaitu: (a) analisis e-modul berbasis metode Socrates; (b) keefektifan e-modul berbasis metode Socrates. Berdasarkan hasil validasi oleh ahli media dengan persentase 94.85% dikategorikan sangat layak. Hasil validasi oleh materi dengan persentase 94.65% dikategorikan sangat layak. Sedangkan, hasil validasi oleh bahasa dengan persentase 89.75% dikategorikan sangat layak. Hasil uji coba pretest dengan persentase 45% dengan peserta didik yang tuntas sebanyak 3 orang dan yang tidak tuntas yaitu 17 orang. Sedangkan uji coba posttest dengan persentase 83,5% dengan siswa yang tuntas sebanyak 19 orang dan yang tidak tuntas sebanyak 1 orang. Dapat disimpulkan bahwa e-modul berbasis metode Socrates layak dan efektif untuk digunakan.

Keywords: e-modul; metode Socrates; matematika; hasil belajar

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Introduction

Technological developments are increasingly rapid, and this also has an impact on the education sector. This is in line with Hemilia et al (2022) who say that the development of technology and knowledge is increasingly rapid and has a big influence on life, one of which is the field of education. To support education, facilities and infrastructure are needed. In accordance with the provisions of Law no. 20/2003, Article 45 Paragraph 1, provides the following explanation: In accordance with the growth and development of students' physical, intellectual, and social, emotional and psychological potential, facilities and infrastructure are provided by each formal and non-formal education unit. These facilities and infrastructure will later support the learning process in the classroom. This is in line with Qamariah et al (2023) who say that the learning process must have adequate learning equipment so that teaching and learning activities run in accordance with the expected basic competencies. So that the learning process can run effectively and efficiently, teaching materials can be used which is in accordance with student needs and supports the competencies that students want to achieve. Facilities and infrastructure that can help teachers in the learning process are learning tools. One learning tool that can support the learning process in the classroom is the use of e-modules. E-Module is a learning media that contains materials, methods, limitations and ways of evaluating that are designed systematically and interestingly to achieve the expected competencies according to the level of difficulty electronically (Nomizar et al., 2023). This is in line with (Fitri, Kurniawan, & Ngazizah, 2013) who say that e-modules are electronic teaching materials designed by teachers to be studied independently with teacher guidance by students presented systematically.

The use of e-modules in learning can increase students' interest in learning. This is in line with Violadini & Mustika (2021) that using e-modules makes students more interested in learning, therefore it is highly recommended for teachers to use e-modules in their learning process. The e-module is equipped with appropriate teaching material components, there are also pictures, video links to practice questions and formative tests to attract students' interest in studying the e-module (Elvarita et al., 2020). Istuningsih (2018) said that e-module development aims to attract students' attention and attention so that they can improve their learning outcomes through structured and organized

presentation. With electronic modules, learning activities can be carried out anytime, anywhere.

According to Daryanto (2013:9) a good learning e-module has several characteristics, namely (a) self instruction is an important e-module characteristic and must be found in the E-module. An e-module must have clear instructions so that it is easy for students to use it and students know what kind of learning objectives they must achieve, (b) self contained, namely the learning materials presented in the E-module are complete so that students can learn the material completely, (c) stand alone, namely the learning E-module must stand alone or not depend on other teaching materials or do not require other supporting tools in their use. If the learning E-module still requires other teaching materials for its use, the learning e-module is not categorized as a stand alone learning e-module, (d) adaptive, namely the learning E-module has the ability to adapt to developments in science and technology. A good e-learning module must be able to adapt to developments in science and technology. Learning E-modules can be said to be adaptive if the e-module is in accordance with developments in science and technology and is flexible to use, (e) User friendly, namely that the learning E-module should be friendly or familiar to the user. Every explanation and instruction contained in the e-module is helpful and friendly to the user. One form of user friendly learning e-module is using simple and easy to understand language and using commonly used terms.

According to Laili et al (2019), the advantages of using e-modules include: (a) being able to foster motivation for students, (b) the evaluation allows teachers and students to know which parts have not been completed or have been completed, (3) learning materials can be divided so that they are more evenly distributed in one semester, (4) learning materials are arranged according to academic levels, (5) can make modules more interactive and dynamic compared to printed modules which are more static, (6) can use video, audio and animation to reduce the verbal elements of high print modules. Meanwhile, Puspitasari et al (2020) said that the advantages of this e-module are (a) the contents of electronic teaching materials which include material and practice questions are presented in a variety of ways, not only text but there are pictures and videos that support the learning material, (b) electronic teaching materials or e-modules can make it easier for students to study certain sections according to which are desired. The

weakness of electronic teaching materials or e-modules is the lack of adequate learning devices such as computers or other electronic devices.

According to Majid (2014), developing e-modules requires methods in the learning process, the use of methods in a series of learning systems plays a very important role. One learning method that can be used in e-modules is the Socratic method. The Socratic method is a learning method that can develop students' critical thinking (Susiani & Kadek Suranata, 2017). This is in line with (Sujana in H & Sa'diyah, 2022) saying that the Socratic Method is a method that stimulates students to analyze a problem with an analogy and think critically about arguments. Furthermore, this method also helps students to answer various kinds of problems in everyday life. According to Gumilar (2018:2), Socratic learning is learning that is able to reduce misconceptions, train high-level thinking skills such as critical, logical and self-monitoring thinking skills in the learning process.

According to Rusmana (2009: 162) says that the Socratic method consists of four activity steps, namely: (a) Experiential Phase, namely where the counselor carries out counseling activities which are directed at efforts to facilitate individuals to express feelings that are a psychological burden in accordance with the scenario that has been prepared. previously set. (b) Identification phase, in this phase the counselor carries out the process of identifying and reflecting on experiences during the training process. In this phase, the counselee or member is asked to look inside himself at the connection between the game process and his own situation. At this stage, the client is also invited to express thoughts and feelings related to the experiential process. So that the client represents the psychological condition and problems they face. (c) Analysis phase, this phase provides the client with the opportunity to reflect and think about the relationship between counseling and the psychological condition they are facing. So it can be used to make plans to improve one's weaknesses. (d) Generalization phase, this phase invites the counselee to make a plan to improve the weaknesses faced by the counselee.

According to Chotimah & Wahyudin (2020), the advantages of the Socratic method are: (a) teacher preparation does not involve just summarizing the material to be taught, (b) increases student activity, and (c) encourages students to think more in the sense that students can find answers themselves. itself and the teacher only as a facilitator.

Meanwhile, the weaknesses of the Socratic method are: (1) the questioning technique is

a thinking and speaking skill, (2) these skills cannot be trained suddenly, and (c) skills can be obtained through continuous practice in real situations when teaching students. student.

Based on observations made by researchers at MIS AL Hidayah Sidomulyo, it is known that the learning outcomes of class V students are relatively low. This is because students do not understand the explanation of the material presented by the teacher. Therefore, students find it difficult to complete the exercises given by the teacher. Students also do not have the courage to express their ideas to answer the problems given by the teacher.

To resolve the problems that occur in MIS AL Hidayah Sidomulyo, one solution that can improve learning outcomes for learners is mathematics lessons. Mathematics is one of the subjects taught to elementary school students with the aim of helping students prepare themselves to face changing circumstances in their environment through practicing acting and thinking logically and rationally (Amir, 2013). Mathematics is a formal, abstract, hierarchical and meaningful symbolic language, mathematics is also a deductive science. Therefore, for a teacher to be able to interpret the deductive world of mathematics, primary intelligence is needed to make connections to the world of children who do not yet think deductively (Farida & Rahayu, 2017). Dienes in Andriyani and Samiyem (2022) said that learning mathematics involves a hierarchical structure of higher level concepts which are formed on the basis of what has been formed previously.

Mathematics learning has several goals, one of which is to solve existing problems through students' own reasoning power. This is in line with Sukmawati et al (2022) who say that the aim of learning mathematics is to prepare students to have problem solving, communication, reasoning, connection and representation skills. (Marfu'ah et al., 2022) said that mathematics learning in schools has the aim of ensuring that students have good reasoning power in solving problems in mathematics learning.

Based on the description above, researchers will develop an e-module based on the Socratic method to improve critical thinking skills at MIS AL Hidayah Sidomulyo.

Method

This research is research and development. The development model used in this research is the ADDIE development model. Hidayat & Nazar (2021) said that ADDIE is Analyze, Design, Develop, Implementation and Evaluate. This research only reached the implementation stage. This research was carried out in MIS AL Hidayah Sidomulyo. The research subjects were 20 class V students, consisting of 9 male students and 11 female students. The object of this research is an e-module based on the Socratic method to improve students' critical thinking skills. Data collection techniques are observation, tests and questionnaires. The data analysis techniques used are: (a) e-module analysis based on the Socratic method; (b) the effectiveness of e-modules based on the Socratic method.

Table 1. Likert Scale (Kesumawati et al, 2022)

No	Answer	Score
1	Very good	4
2	Good	3
3	Enough	2
4	Not good	1

To determine the feasibility of an e-module based on the Socratic method, the formula used is as follows:

$$\text{Mark Validation} = \frac{\text{jumlah skor yang diperoleh}}{\text{jumlah skor tertinggi}} \times 100\%$$

Table 2. Product Feasibility Test Classification Criteria (Lubis et al, 2023)

No	Score	Classification
1	90% X < 100%	Very Worth It
2	80% X < 90%	Worthy
3	70% X < 80%	Decent Enough
4	60% X < 70%	Not feasible
5	0% X < 60%	Totally Not Worth It

The formula for calculating student learning outcomes is as follows:

$$P = \frac{f}{N} \times 100\% \quad (\text{Rahayuningsih \& Eliyarti, 2019})$$

Information :

- P :Percentage
 f :Frequency
 N :Total Activity Number

Results and Discussion

Based on the research results, research is based on the success of students in using it e-module based on the Socratic method in the learning process. This research uses the ADDIE development model. The research has gone through several stages including the following:

Analyze

At stage this researchers conduct analysis in MIS AL Hidayah Sidomulyo. The results of this analysis will be a reference for researchers in developing method based e-modules *Socrates*. At this stage the researcher analyzes the problem, learning material, and student characteristics.

Problem analysis is carried out so that researchers know the problems that occur in the learning process in the classroom. To obtain this information, researchers conducted direct observations at MIS AL Hidayah Sidomulyo. From the observations that have been made, researchers know that during the learning process teachers only use textbooks. And when the teacher explains the learning material, the teacher only uses lecture and question and answer methods. This makes students not interested in participating in learning, when the teacher asks questions, only a few students can answer the questions given by the teacher.

Material analysis was carried out so that researchers knew which learning materials were considered difficult by students. This analysis aims to identify and compile material that is suitable to be used as teaching material. Based on the results of the analysis of learning materials, researchers developed e-modules method based *Socrates*.

Characteristic analysis was carried out with the aim of knowing the characteristics of class V students at MIS AL Hidayah Sidomulyo. Because basically elementary school students like new things that can attract their attention in learning. By using e-modules method based *Socrates* can train students' thinking and activeness in participating in the learning process in the classroom.

Design

At this stage the researcher has designede module method based *Socrates*. Researchers create e-modules by including material, practice questions and answers to questions that can train them learners to think and practice active nesslearnersin the

classroom. This aims to make things easier learners in understanding the material that will be explained, and making it easier learners in solving problems given by the teacher.

Researchers prepared validation questionnaires for 3 experts, namely linguists, media experts and linguists. These experts will validate the product to be developed, namely e-module method based *Socrates*.

Develop

At this stage, e-module method based *Socrates* has been completed, and has been validated by linguists, media experts and material experts. When carrying out validation, researchers get suggestions and input from experts to improve method-based e-modules *Socrates*. The suggestions and input from experts are improving the writing, improving the colors of the e-module to make it more attractive by using more contrasting colors, adding images, making the cover of the e-module even more attractive. After getting suggestions and input from experts, the researchers made improvements to the e-module method based *Socrates*. *The validation results for method based e-module Socrates* namely as follows:

Table 3. Expert Validation Results

No	Validation	Percentage	Criteria
1	Materials Expert	94.65%	Very Worth It
2	Linguist	89.75%	Very Worth It
3	Media Expert	94.85%	Very Worth It

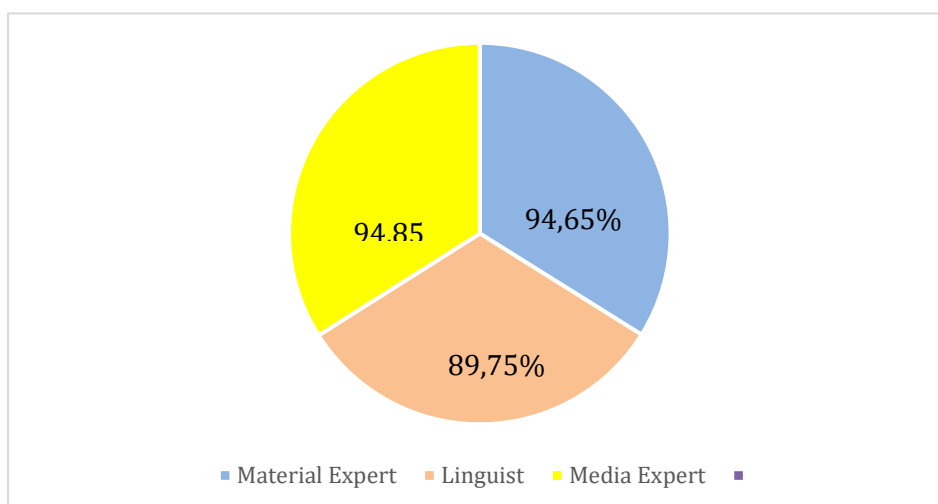


Figure 1. Expert Validation Results

Based on table 3 and figure 1, the validation results carried out by material experts, language experts and media experts, it is known that the validation results by media experts with a percentage of 94.85% are categorized as very feasible.

Implementation

After e-module method based *Socrates* has been validated by experts and is said to be suitable for use. Then e-module method based *Socrates* is ready to be tested on class V students at MIS AL Hidayah Sidomulyo. The trial was carried out in two stages, namely pretest and posttest. The purpose of conducting pretest trials and posttest trials is to determine the improvement in student learning outcomes in mathematics lessons by using e-module method based *Socrates*. The student learning outcomes in mathematics lessons using e-modules method based *Socrates* can be seen in the table below:

Table 4. Results of Pretest and Posttest Values

No	Student's	Pretest	Criteria	Posttest	Criteria
1	N01	50	Not Completed	80	Complete
2	N02	40	Not Completed	80	Complete
3	N03	60	Not Completed	90	Complete
4	N04	50	Not Completed	70	Complete
5	N05	70	Complete	90	Complete
6	N06	40	Not Completed	100	Complete
7	N07	30	Not Completed	80	Complete
8	N08	30	Not Completed	100	Complete
9	N09	40	Not Completed	90	Complete
10	N010	50	Not Completed	80	Complete
11	N011	70	Complete	90	Complete
12	N012	50	Not Completed	70	Complete
13	N013	50	Not Completed	90	Complete
14	N014	40	Not Completed	80	Complete
15	N015	60	Not Completed	70	Complete
16	N016	80	Complete	100	Complete
17	N017	30	Not Completed	60	Not Completed
18	N018	40	Not Completed	90	Complete
19	N019	50	Not Completed	80	Complete
20	N020	60	Not Completed	80	Complete
	Amount		990		1670
	Average		0.45		0.835
	Percentage		45%		83.5%

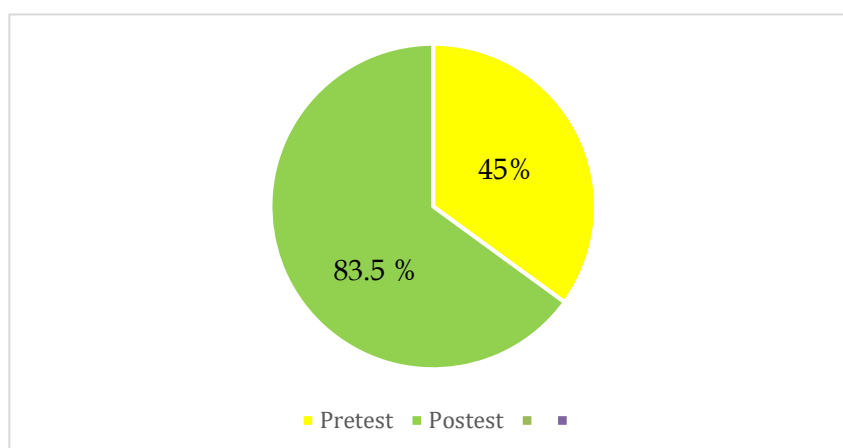


Figure 2. Pretest and Posttest Score Results

From table 4 and figure 2 above, it is known that the results of the pretest trial were 45% with 3 students who completed and 17 students who did not complete. Meanwhile, the posttest trial had a percentage of 83.5% with 19 students who completed and 1 student who did not complete.

Discussion

The resulting Socratic method based e-module has been developed using the ADDIE development model. Stages in the ADDIE development model that is *analyze, design, develop, implementation, and evaluate*. This research only reached the implementation stage. The results of the discussion in the research are as follows:

Based on table 3 and figure 1, the validation results carried out by material experts, language experts and media experts, it is known that the validation results by media experts with a percentage of 94.85% are categorized as very feasible. Parinduri et al (2022) said that 89.00% of media experts were categorized as very suitable. Shabrina et al (2023) said that the media validation results were with a percentage of 95.45% and were categorized as very feasible. This is in line with Mufida et al (2022) who said that the validation results from media experts were 92.7%. This is in line with Hasanah et al (2023) who stated that the media validation results were 90.4% and included in the very feasible category.

The results of validation by material with a percentage of 94.65% are categorized as very feasible. Novianti & Lubis (2022) said that the material validation results were

97% in the very feasible category. Nisrina et al (2021) said that the material validation results, with a percentage of 88.61%, were categorized as very feasible. Permata & Mustaji (2021) said that the results of material validation, namely the percentage (93.75%) were categorized as very feasible. This is also supported by Amalia & Sujatmioko (2022) who said that the validation results with a percentage of 81.88% were categorized as feasible.

Meanwhile, validation results by language with a percentage of 89.75% are categorized as very feasible. Azkiya et al (2022) said that language validation results with a percentage of 92.5% were categorized as very feasible. Umbara (2022) said that the language validation results, with a percentage of 93.75, were categorized as very appropriate. Putri & Rahayu (2023) said that the validation results of language experts were in percentages 84.38% and includes the criteria "very feasible". This is also supported by research by Ihsan & Hully (2023) which states that the validation results of language experts are by percentage 94.72 is categorized as very feasible.

From table 4 and figure 2 above, it is known that the results of the pretest trial were 45% with 3 students who completed and 17 students who did not complete. Meanwhile, the posttest trial had a percentage of 83.5% with 19 students who completed and 1 student who did not complete. This is supported by research by Agung et al (2021) which states that there was an increase during the pretest and posttest using e-modules. This can be proven during the pretest trial with a percentage of 37.91% and increased during the posttest trial with a percentage of 83.73%. Herawati & Muhtadi (2018) said that analysis of the results of the t test for increasing score gain obtained a calculated t value of 4.8 with a significance of $0.000 < 0.05$. This proves that there is a significant difference between the pretest scores and the posttest scores. So, this module effectively influences student learning outcomes. Furqan et al (2016) said that the highest increase in KPS occurred in the forecasting indicator, namely with an N-gain of 0.93% and was included in the very high category. Meanwhile, the lowest increase in N-gain occurred in the indicator providing a hypothesis, namely 0.12% and included in the low category. A statistical test with a significance level of 0.05% shows that the value obtained is $10.6 > 1.714$ because $t_{count} > t_{table}$, it can be concluded that the application of inquiry based practicum modules can significantly improve science process skills and student learning

outcomes. Husna et al (2020) said that the effectiveness seen from the pre-test and post-test N-gain test had increased with an average of 0.67 in the medium category.

Based on the pretest and posttest trials, it is known that there is an increase in student learning outcomes in mathematics lessons by using e-module method based *Socrates*. With these results, it can be said that by using e-module method based *Socrates* in mathematics lessons for class V students in MIS AL Hidayah Sidomulyo effective use.

Conclusion

The resulting Socratic method based e-module has been developed using the ADDIE development model. Stages in the ADDIE development model that is *analyze, design, develop, implementation, and evaluate*. This research only reached the implementation stage. Based on validation results by media experts with a percentage of 94.85%, it is categorized as very feasible. The results of validation by material with a percentage of 94.65% are categorized as very feasible. Meanwhile, validation results by language with a percentage of 89.75% are categorized as very feasible. The results of the pretest trial were with a percentage of 45% with 3 students who completed it and 17 students who did not complete it. Meanwhile, the posttest trial had a percentage of 83.5% with 19 students who completed and 1 student who did not complete. It can be concluded that the e-module based on the Socratic method is feasible and effective to use.

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