International Seminar on Student Research in Education, Science, and Technology
ISSN 3047-1532 | Volume 1 April 2024, pp. 610-615

https://www.issrestec.id/
http://journal.ummat.ac.id/index.php/issrestec
Universitas Muhammadiyah Mataram, Indonesia

Development of Constructivism-Based E-Modules in Class VIII of Gajah Mada Junior High School

Suharmita[1*], Esra Pasaribu[2], Rustani Silitonga[3], Dichi Akbar Wahyudi[4]
[1,2,3,4]Mahasiswa Pascasarjana S2 Pendidikan Matematika, Universitas Negeri Medan, Indonesia
suharmita@mhs.unimed.ac.id[1] esraa.pasaribu@gmail.com[2] rustanysil02@gmail.com[3]
dichiakbar22@gmail.com[4]

Abstract: This study aims to obtain a constructivism-based e-module that is valid, practical, and effective, so that it can assist students in understanding the material for a two-variable linear equation system. The research instruments used were lesson plans, material validation sheets and e-module media, learning outcomes tests, and student and teacher response questionnaire sheets. After all instruments, lesson plans, and e-modules were declared valid by the validator, then readability tests and field trials were carried out. The results showed that: (1) the developed E-Module had met the validity values, namely (3.37 and 3.25) with a very feasible category; (2) The developed E-Module has met the practical value (79.75% and 90.5%) with very practical category; (3) The developed E-Module meets the effective criteria with the completeness of student learning outcomes that meet the criteria, namely 85% of students have obtained a score of 75 and the achievement of each indicator/learning objective is more than 65% of the total students.

Keywords: E-Modul, Constructivism, System Of Linear Equations Two Variables.

Article History:
Received: 15-03-2024
Online : 16-04-2024

A. INTRODUCTION

Mathematics is a universal science that underlies the development of modern technology, and has an important role in various sciences and advances human thinking (Meidawati, 2014). Studying mathematics aims to develop creativity and train students' thinking power in problem solving, understanding, reasoning and communication (Supriadi, 2015). In class VIII SMP/MTs mathematics learning, one of the materials taught is systems of linear equations in two variables (SPLDV). SPLDV material is material that requires quite a high level of reasoning because it concerns abstract concepts that are given symbols. Class VIII SMP/MTs students have difficulty learning systems of linear equations in two variables (SPLDV). Therefore, teachers as educators must have innovation in providing teaching related to SPLDV, so that students understand and understand the concept of SPLDV, and are able to connect SPLDV learning with everyday life (Fajriah., & Sari, 2014). Based on interviews conducted with Gajah Mada Middle School mathematics teacher (Azka Hidayat, S.Pd.I), it is known that there are still many students who experience difficulties in understanding SPLDV material. These difficulties have an impact on mathematics learning outcomes which are classified as low and below the minimum completeness criteria (KKM) (score 75). The mathematics teacher

explained that the students' difficulties in the SPLDV material lay in changing the sentences in the questions into mathematical form.

Students' difficulties in understanding SPLDV are caused by several factors, namely inappropriate delivery of material, poor student abilities, and inappropriate strategies or approaches (Hasratuddin, 2013). The lack of availability of teaching material resources that suit students' characteristics is one of the causes of students' lack of understanding in understanding the material presented, resulting in low student learning motivation which results in low student learning outcomes (Maryam, 2019).

New innovations in teaching materials that you want to convey to students are the right steps to foster students' interest in learning. It is hoped that innovations in teaching materials carried out by educators can change students' paradigms in mathematics lessons which seem difficult. This is the background for the author to develop a material, one of which is electronic-based. The teaching materials used by the author are electronic modules (E-Modules). The use of the E-Module designed is focused on discussing SPLDV material. This material will be presented in written form, learning videos that support SPLDV explanations, and interesting animations, so that students pay more attention and respond to the material being taught, and can easily absorb and understand the concepts of the material being taught. The development of this e-module was carried out with a previously existing module, namely, the e-module developed by Supardi., et al (2019), in research entitled "Development of a Mathematics Learning Module Based on a Constructivist Approach to Logarithm Material" and the research by Fitri (2017) entitled "Development of Learning Tools Based on a Constructivist Approach to Improve the Ability to Understand Concepts in Circle Equation Material". The difference from the previous module is that in this research the module is presented using technology so that it is in electronic form and is equipped with learning media such as learning videos and animations that support explanations of the SPLDV material.

Several research results related to this research, namely research by Novallyan., et al (2020) showed that the results of lecturers' and students' responses to constructivism-based general biology e-modules using 3D pageflip were in the very good category, thus the e-module can be used as a tool. help in learning. Maiyena., et al (2020) resulted in a constructivism-based electronic physics module that was developed which was very valid and effective with a percentage of 89.08%. Based on problems found in mathematics learning at Gajah Mada Middle School as well as an explanation of electronic modules (e-modules) and constructivist approaches. So constructivism-based electronic modules are believed to be suitable for overcoming students' difficulties in learning mathematics, especially in SPLDV material.

B. METHOD

This research was carried out at Gajah Mada Middle School. The research location was chosen because previously this school had never used E-Modules as a mathematics learning resource. The time for conducting the research is the odd semester of the 2023/2024 academic year. The subjects in this research were class VIII students at Gajah Mada Middle School. The researcher used class 8A with 20 people and class 8B with 19 people. The object of this research is teaching materials in the form of constructivism-based e-modules. This type of research is

research and development. The research and development carried out is to develop a new product and perfect it. The development model used as the basis for this research is the ADDIE development model. This model, as the name suggests, consists of five main phases or stages, namely (A) analysis, (D) design, (D) development, (I) implementation, and (E) evaluation (Nieeven, 1999). By using this model, researchers will develop a teaching material product in the form of a constructivism-based E-Module.

C. RESULTS AND DISCUSSION

Based on the description of the research results outlined in the research results, a Learning Implementation Plan (RPP), test instruments (pretest and posttest), and constructivism-based e-module on two-variable linear equation systems were obtained. This e-module was developed using the ADDIE development model with five stages, namely: (1) analysis stage (Analysis), (2) design stage (Design), (3) development stage (Development), (4) implementation stage (Implementation), and (5) evaluation stage. After all the development stages have been passed, a quality e-module will be obtained in terms of validity, practicality and effectiveness. From the evaluation results of each stage of constructivism-based e-module development that has been carried out, all aspects such as lesson plans, test instruments, and e-modules developed have met the criteria of being valid, practical, and effective. So the ADDIE model development cycle to obtain quality (valid, practical and effective) interactive teaching materials has ended.

1. Validity of Constructivism-Based E-Modules in Learning

The validation results by material expert validators, media experts, teachers and students on the constructivism-based e-module for the device are classified as valid. The criteria are very feasible for media expert validation questionnaires, teacher response questionnaires, and student response questionnaires for constructivism-based e-modules with average scores of 3.25, 3.61, and 3.19 respectively from a maximum score of 4.00. The results of constructivism-based e-module validation show that the criteria are very feasible for material validation results with an average score of 3.37, and also very feasible for media validation results with an average score of 3.25 from a maximum score of 4.00.

2. Practicality of Constructivism-Based E-Modules in Learning

Constructivism-based e-modules are declared practical based on practicality criteria obtained through: (1) student (practitioner) assessments of the tools developed are stated as practical or very practical, and (2) the results of the teacher's response to the tools developed are included in the practical or very practical category very practical. Based on the results of the analysis of student response questionnaires, the constructivism-based e-module obtained a practical validity of 79.75% and 90.5% based on the teacher response questionnaire. So that teaching materials can be categorized as very practical, in accordance with the practicality criteria guidelines used by researchers, namely that a device is declared very practical if it has a practical validity value in the range of 76% -100%.

3. The Effectiveness of Constructivism-Based E-Modules in Learning

Basically, effectiveness is the level of achievement of the goals or targets set. Akker (1999) states that effectiveness refers to increased experience and intervention results that are consistent with the intended goals. Therefore, teachers must be able to organize students and learning facilities and control them in a pleasant atmosphere to achieve predetermined goals. Effective teachers (Trianto, 2018) are teachers who fully master their field of study, are able to establish sympathetic relationships with students, create a classroom environment that is nurturing, full of attention and has a love of learning, and can motivate students to work not only to achieve achievement but rather being a loving member of society. Based on readability tests and field trials, the constructivism-based e-module developed has met the effective criteria in terms of: (1) classical student learning completeness, namely at least 80% of students participating in learning are able to achieve a minimum score of 75, (2) achievement of learning objectives 75% for each indicator was obtained by a minimum of 65% of students, and student responses to learning were positive.

4. Achieving Classical Student Learning Completeness

In this research, the reference for achieving completeness is the Minimum Completeness Criteria (KKM) which has been determined by Gajah Mada Middle School for the field of mathematics study, namely 75. Based on the results of the analysis of the problem solving ability test in the field trial, it was found that student learning outcomes in the posttest (test final ability) has met the classical criteria for completion. In the pretest results of the field trial, there were 4 students (20%) who completed or exceeded a score of 75, while 16 students (80%) got a score below 75 and were declared incomplete. Meanwhile, in the posttest results, there was an increase of 65% in the number of students who obtained scores that reached or exceeded the KKM, namely 22 students (85%) and 3 students (15%) were declared incomplete. Because the number of students who get a score of ≥75 in class is ≥80% of the total students, class VIII is said to have completed their studies.

5. Achievement of Indicators/Completion of Learning Objectives

The criteria for achievement of indicators/learning objectives is a minimum of 75% for each indicator obtained by a minimum of 65% of students. Based on the criteria for achieving indicators in field trials, the achievement of indicator 1 was 61.75% in the pretest and 83% in the posttest. Achievement of Indicator 2 was 77.05% in the pretest and 77.25% in the posttest. In indicator 3, the achievement of pretest completeness was 66.55%, while the achievement of posttest completeness was 77.15%. And the achievement of indicator 4 was 57.5% in the pretest, increasing to 79.7% in the posttest. From the results of the achievement of each indicator which exceeds 65% of the total students, it can be concluded that the achievement of the indicators/completeness of the learning objectives in the field trial has been achieved.

From the overall results obtained, it can be concluded that the constructivism-based e-module on two-variable linear equation systems has met the effectiveness criteria based on achieving learning completeness. Meanwhile, 79.75% of the total students responded positively to the e-module being developed. Thus, the constructivism-based e-module meets

the effective indicators for student responses, because it has exceeded the minimum limit of 80% of students who took part in the learning responding in the good category.

D. CONCLUSIONS AND SUGGESTIONS

Based on the results of the research that has been carried out, it can be concluded that the development of a constructivism-based e-module in class VIII of Gajah Mada Middle School on two-variable linear equation systems using the ADDIE development model has a validity value (3.37 and 3.25) with a very feasible category, practical value (79.75% and 90.5%) in the very good practical category, and has good effectiveness because it is proven that the completeness of student learning outcomes has met the criteria, namely 85% of students have obtained a score of ≥75 and the achievement of each indicator/learning objective has exceeded 65% of total students. From the results of the development carried out, the constructivism-based e-module is in the category suitable for use. However, with several suggestions or input given to improve this e-module, it does not rule out the possibility of further improving it. In the learning process using constructivism-based e-modules, it is recommended that the media in question interact directly with students, not only be displayed in front of the class by the study teacher. This constructivism-based e-module can be used as a reference or point of reference for developing a new learning tool for other material, in order to develop students' interest in learning and understanding of the material, both at different educational unit levels.

ACKNOWLEDGMENTS

The author realizes that the preparation of this research would not have been completed properly without assistance from various parties. Therefore, the author would like to express his thanks to all parties who have helped the author in compiling this research

REFERENCES

Akker, J. V. D., et al .(1999). *Design approaches and tools in educational and training* .Dordrecht: Kluwer Academic Publisher.

Fajriah, N., & Sari, D. (2014). Meningkatkan Pemahaman Konsep Matematis Siswa Pada Materi SPLDV Melalui Model Pembelajaran Kooperatif Tipe Think-Pair-Share di Kelas VIII SMP. *EDU-MAT Jurnal Pendidikan Matematika*, 4(1),68-75

Fitri, R. (2017). Pengembangan Perangkat Pembelajaran Berbasis Pendekatan Konstruktivisme untuk Meningkatkan Kemampuan Pemahaman Konsep pada Materi Persamaan Lingkaran. *Jurnal Nasional Pendidikan Matematika*. 1(2)

Hasratuddin. (2013). Membangun Karakter Melalui Pembelajaran Matematika. *Jurnal Paradikma*. 6(2)

Maiyena, S., Imamora, M., Putri, E. R. (2020). Pengembangan Modul Elektronik Fisika Berbasis Konstruktivisme Untuk Kelas X SMA. *JoTaLP: Journal of Teaching and Learning Physics*, 5(1): 01-18

Maryam, dkk. (2019). Pengembangan E-Modul Matematika Berbasis Open Ended pada Materi Sistem Persamaan Linear Dua Variabel Kelas VIII. *Aksioma: Jurnal Matematika dan Pendidikan Matematika*. 10(1)

Meidawati, Y. (2014). Pengaruh Pendekatan Pembelajaran Inkuiri Terbimbing Terhadap Peningkatan Kemampuan Pemecahan Masalah Matematis Siswa SMP. *Jurnal Pendidikan Dan Keguruan*. 1(2): 2

Nieveen, N. (1999). *Prototyping to Reach Product Quality*. London: Kluwer Academic Publisher.

Novallyan, D,, Gusfarenie, D., &Safita, R. (2020). Pengembangan E-Modul Biologi Umum Berbasis Konstruktivisme Menggunakan 3D Pageflip.‖ *Jurnal Kependidikan Betara (JKB)*, 1(4)

Supardi, A. A., Gusmania, Y., & Amelia, F. (2019). Pengembangan Modul Pembelajaran Matematika Berbasis Pendekatan Konstruktivisme Pada Materi Logaritma. *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*. 10(1)

Supriadi, N. (2015). Pembelajaran Geometri Berbasis Geogebra Sebagai Upaya Meningkatkan Kemampuan Komunikasi Matematis Siswa Madrasah Tsanawiyah (MTs). *Al-Jabar: Jurnal Pendidikan Matematika*. 6(2), 99-109

Trianto. (2018). *Mendesain Model Pembelajaran Inovatif Progresif*. Jakarta: Kencana