Jurnal Pedagogi dan Pembelajaran
Volume 6, Number 3, Tahun 2023, pp. 473-482
P-ISSN: 2614-3909 E-ISSN: 2614-3895
Open Access: https://doi.org/10.23887/jp2.v6i3.63563

Low Grade Mathematics Practicum Digital Teaching Module to Improve Teaching Skills

Made Ceger Artha Wiguna[1*], Gede Wira Bayu[2], I Nyoman Laba Jayanta[3]

[1,2,3] Department of Basic Education, Ganesha Education University, Singaraja City, Indonesia

ARTICLE INFO

Article history:
Received June 14, 2023
Accepted October 10, 2023
Available online October 25, 2023

Kata Kunci:
Pengembangan, Modul Ajar, Keterampilan Mengajar, Matematika Kelas Rendah

Keywords:
Development, Teaching Modules, Teaching Skills, Low Grade Mathematics

ABSTRAK

Belum adanya modul ajar digital pada mata kuliah matematika kelas rendah mengakibatkan rendahnya keterampilan mengajar mahasiswa. Tujuan penelitian ini adalah untuk menghasilkan rancang bangun, menganalisis validitas, kepraktisan dan efektivitas modul ajar terhadap keterampilan mengajar matematika mahasiswa PGSD. Penelitian ini adalah penelitian pengembangan model pengembangan ADDIE. subjek yang diteliti adalah modul ajar digital pratikum pembelajaran matematika. Sedangkan objek dalam tahap pengembangan adalah validitas isi, desain, media modul ajar, respon dosen, dan respon mahasiswa. Metode pengumpulan data yang digunakan adalah lembar rating scale. Teknik analisis data yang digunakan adalah analisis kualitatif yang mencangkup pernyataan, masukan maupun saran dan analisis kuantitatif yang mencangkup analisis deskriptif, analisis inferensial, yaitu uji prasyarat dan uji hipotesis yang menggunakan uji t atau one sample t-test. Hasil penelitian menunjukan bahwa persentase dari ahli materi, ahli media, ahli desain dengan kualifikasi keseluruhan validitas sangat tinggi dan untuk persentase dari praktisi sebesar 87,95% dengan kualifikasi sangat baik. Hasil efektivitas menunjukan terdapat pengaruh penggunaan modul ajar digital praktikum pembelajaran matematika kelas rendah terhadap keterampilan mengajar Matematika mahasiswa PGSD. Disimpulkan efektif penggunaan modul ajar digital praktikum pembelajaran matematika kelas rendah dapat meningkatkan keterampilan mengajar Matematika mahasiswa PGSD.

ABSTRACT

The absence of digital teaching modules in lower-class mathematics courses has resulted in low student teaching skills. This research aims to produce a design to analyze the validity, practicality, and effectiveness of teaching modules on PGSD students' mathematics teaching skills. This research is research into the development of the ADDIE development model. The subject studied is a practical digital teaching module for mathematics learning. Meanwhile, the objects in the development stage are content validity, design, teaching module media, lecturer responses, and student responses. The data collection method used is a rating scale sheet. The data analysis technique used is qualitative analysis, which includes statements, input, and suggestions, and quantitative analysis, which includes descriptive analysis and inferential analysis, namely prerequisite tests and hypothesis tests using the t-test or one sample t-test. The research results show that the percentage of material experts, media experts, and design experts with overall validity qualifications is very high, and the percentage of practitioners is 87.95% with excellent qualifications. The effectiveness results show an influence of the use of digital teaching modules for lower-grade mathematics learning practicum on PGSD students' Mathematics teaching skills. It was concluded that the effective use of digital teaching modules for lower-grade mathematics learning practicums could improve PGSD students' Mathematics teaching skills.

1. INTRODUCTION

Development and education are two things that mutually influence each other. These two concepts are different but related. Education can provide a platform for development (Yuni et al., 2016; Zahwa & Syafi'i, 2022). For this reason, education requires competent human resources as an asset for the development process and competent human resources are achieved through the development process. Thus, HR becomes an important part of development and education (Ningrum, 2016; Sholihah & Firdaus,

Corresponding author
*E-mail addresses: Cegerartha24@gmail.com (Made Ceger Artha Wiguna)

2019). Education has a positive influence on the growth of every living creature, because education is learning knowledge that occurs throughout life (Andiyanto, 2018; Pristiwanti et al., 2022).Education itself cannot be separated from teaching skills, therefore in the learning process teachers must have good teaching skills. Teaching skills greatly influence student achievement (Mansur, 2017; Monawati & Fauzi, 2018). An educator who has good teaching skills can create a pleasant, efficient and effective teaching atmosphere in delivering learning material (Abdullah, 2017; Fakhrurrazi, 2018).

Teaching skills must be possessed by all educators, including at the tertiary level. The tertiary level is a level where the level of learning provided is already at a certain level (Hignasari & Diputra, 2021; Hutabarat, 2020). Learning is interpreted as a process of changing behavior as a result of individual interactions with their environment. Changes in behavior towards learning outcomes are continuous, functional, positive, active and directed (Pane & Darwis Dasopang, 2017; Rohmah, 2017). Success in the learning and learning process can be seen through the level of success in achieving educational goals (Nabillah & Abadi, 2020; Sirait, 2021). By achieving the learning objectives, it can be said that the lecturer has been successful in teaching. Thus, the effectiveness of a learning and learning process is determined by the interaction between these components (Anisa et al., 2020; Pane & Darwis Dasopang, 2017). Teaching skills are very important to achieve maximum learning outcomes (Rahman, 2022b; Wahid, 2018). The most important factor in teaching is the teacher's skill in presenting learning (Mansur, 2017; Rohman & Susilo, 2019). Teaching skills are also closely related to the duties and responsibilities of lecturers as teachers who educate at college or university level. Lecturers as educators have a very broad meaning, not limited to providing teaching materials, but reaching ethical and aesthetic behavior in facing the challenges of life in society. In order to create active, creative and innovative learning, lecturers must first be able to know and identify the characteristics and conditions of their students (Maudiarti, 2018; Syofyan, 2018).

Education students as the front guard as distributors of educational knowledge to the nation's future generations must have the values of creativity and innovation in providing future learning in order to achieve these learning goals. One of them is in mathematics learning courses in elementary school. At the elementary school level, children are experiencing development in their level of thinking, which is from pre-concrete to concrete and towards the abstract stage. Mathematics is a deductive, axiomatic, formal, hierarchical abstract science, a language of symbols dense in meaning. Therefore, special abilities are needed to bridge the world of children who do not yet think deductively to be able to understand the deductive world of Mathematics (Kusrini, 2018; Syahputri, 2018). The theory of cognitive development according to Piaget, elementary school age children are at the concrete operational stage, meaning that in learning students need objects that are concrete and real (Juwantara, 2019; Marinda, 2020). One tool that is suitable for use in mathematics learning is digital teaching modules. E-module is a learning tool or facility that contains material, methods, limitations and ways of evaluating that are designed systematically and interestingly to achieve the expected competencies according to the level of complexity (Elvarita et al., 2020; Idiajir & Daryati, 2021).

E-modules can present information in a structured, interesting manner and have a high level of interactivity (Oktaviara & Pahlevi, 2019; Ratriana et al., 2021). The learning process no longer depends on the instructor as the only source of information. E-modules can also be used to improve conceptual understanding of the material presented by the lecturer concerned. Teaching materials in the form of virtual modules on basic digital techniques received a positive assessment, because the learning materials were very easy for students to understand. Apart from that, operating this e-module is very easy. Music and animation elements are considered to increase students' motivation, interest, activity and creative thinking abilities (Florentina Turnip & Karyono, 2021; Mulyadi & Wahyuni, 2016). This is in line with previous research which states that teaching modules are very important in developing students' 21st century skills in mathematics learning and as a source of students' independent learning (Febriana et al., 2020; Nesri & Kristanto, 2020; Nurmeidina et al., 2020). The novelty in this research is the subject and research object used.

In this Lower Class Mathematics Learning course in elementary school, PGSD students are expected to be able to understand the material thoroughly at elementary school level and be able to achieve goals in accordance with national education which not only hone hard skills but also have to hone and develop soft skills. Both must run simultaneously to create superior students in the future, not only armed with knowledge but also with experience from field practice. However, the explanation above does not match the reality on the ground. In reality, there are still many teaching staff who have not implemented and maximized their teaching skills so that this has an impact on students' results and achievements. The inadequate application of teaching skills can be seen from the use of teaching materials that have not been used in learning. The existence of teaching modules that only contain text and images does not meet learning demands, resulting in students not being able to understand the material optimally. The availability of teaching modules has not been able to meet learning demands. This is measured by students' skills in

carrying out assignments and carrying out practical activities. Seeing this phenomenon, it is known that the existing teaching modules have not been able to make students learn skillfully to achieve learning goals. This is measured by students' skills in carrying out assignments and carrying out practical activities. Several previous studies also show that the use of e-modules is suitable for use in mathematics learning based on validity tests of the products developed (Feriyanti et al., 2019; Irawati & Setyadi, 2021). Previous research only reached the validity testing stage, and this research aims to analyze the validity, practicality and effectiveness of digital teaching modules for lower grade mathematics education practicum in elementary school for PGSD students. The aim of this research isproduce designs, analyze the validity, practicality and effectiveness of teaching modules on PGSD students' mathematics teaching skills.

2. METHOD

This research uses the ADDIE development model, ADDIE is an abbreviation for analysis, design, and development of production, implementation or delivery. The ADDIE model consists of five stages, namely the analysis stage, the design stage, the development stage, the implementation stage and the evaluation stage (Arini & Sudatha, 2023; Cahyadi, 2019)**.** The ADDIE model is a systematic and ordered model whose activities refer to efforts to solve student learning problems, sequential steps to produce products that can be implemented in learning (Dwiqi et al., 2020; Kuncahyono, 2018). Researchers only used four stages, namely analysis, design, development and formative evaluation. Implementation not used. Because it has not been tested and implemented in large classes.

The development stages start from the analysis stage, this is done to determine learning needs and identify problems which consist of analyzing the conditions and needs of students, analyzing student characteristics, and analyzing learning media, the second stage is the design stage, at this stage the module product design is carried out digital teaching for lower grade mathematics learning, the third stage is the development stage, at this stagetested*judges*to determine the validity of the research instrument consisting of 3 experts, realize the product and test the validity of the learning device by experts, the fourth stage is the implementation stage, at this stage what is carried out istry or implement media in the field to find out its effect on the quality of learning. The trial took a sample of one class, namely 2nd semester students in class D, elementary school teacher education study program students at Ganesha University of Education. The trial was carried out using the One Shoot Case Study design, the fifth stage was the evaluation stage, at this stage it was carried out to validate the product that had been created through testing by material experts, media experts and practitioners.

At the development stage, the subject studied was a practical digital teaching module for mathematics learning. Meanwhile, the objects in the development stage are content validity, design, teaching module media, lecturer responses, and student responses. In the implementation stage, the subjects studied were students of the Ganesha Education University PGSD study program. Meanwhile, the objects in the implementation stage are students' teaching skills, while the objects in the development stage are content validity, design, teaching module media, lecturer responses and student responses. At the implementation stage, the subjects studied were students of the Ganesha Education University PGSD study program. Meanwhile, the object in the implementation stage is student teaching skills.There are two types of data in this development research, namely quantitative data and qualitative data. Quantitative data was obtained from expert validation rating scales, student response rating scales, lecturer response rating scales, and effectiveness test data. Meanwhile, qualitative data was obtained from needs analysis, competency analysis achieved by students, analysis of student characteristics, as well as input and suggestions from experts. The data collection methods used in this research are the observation method, interview method, and questionnaire method. The observation method consists ofqualitative observation and quantitative observation. Qualitative observations to obtain data related to the situation in the field. Meanwhile, the instrument used to make quantitative observations is the rating scale sheet. The rating scale sheet is an instrument used at the development stage, to measure the validity of the media by experts and measure the effectiveness of the media in teaching PGSD students. The instrument grid of material experts, media experts, design experts, practitioners, and teaching skills is presented inTable 1,Table 2,Table 3,Table 4, And Table 5.

Table 1. E-module Feasibility Instrument Grid for Material Experts

No.	Aspect	Indicator
1	Self Instruction	Clarity of learning outcomes. Suitability of learning materials. Learning material is supported by examples and illustrations. The teaching modules presented are relevant to the material, activity context and student environment.

No.	Aspect	Indicator
		Use of language that is easy to understand
2	Self Contained	Presentation of complete learning material
3	Adaptive	Practical digital teaching modules are in line with technological developments
4	User Friendly	Practical digital teaching modules are easy to understand

Table 2. E-module Feasibility Instrument Grid for Media Experts

No.	Aspect	Indicator
1	Appearance	The attractiveness of the teaching module display.
		Regularity of teaching module design.
		The background color combination matches the text, images and tables
		Ease of reading text or writing.
		Color selection in teaching modules
		Suitability of material to appearance.
		Presentation of teaching modules.
2	Media Presentation	Accuracy of presentation of material in teaching modules.
		Presentation of images in accordance with the material.
		Ease of use of teaching modules
3	Visual	Suitability of teaching module illustrations with learning materials.
		Accuracy of illustrations with student characteristics.
		The attractiveness of teaching module illustrations with student characteristics.
		Suitability of teaching module layout
		Integration between the type of writing, type of page and material in the teaching module

Table 3. Design Expert E-module Feasibility Instrument Grid

No.	Aspect	Indicator
1	Learning Outcomes	Formulation of learning outcomes
		Clarity of learning outcomes
		Clarity of learning achievement indicators
2	Student Characteristics	Presentation of material
		Use of sentences
		Appropriateness of language use
		Suitability of teaching and learning modules
		Color accuracy
3	Method	Suitability of learning strategies
		Systematic serving
		Giving examples
		Presentation of teaching and learning modules

Table 4. E-module Feasibility Instrument Grid for Practitioners

No.	Aspect	Indicator
1	Practical digital module presentation	The technical quality of the media
2	Quality of practical digital teaching modules	Quality of material content in teaching modules
		Clarity of practical steps in the teaching module

Table 5. Teaching Skills Instrument Grid

No.	Statement
	Questioning Skills
1	Express questions clearly and concisely
2	Provide instructions/references for questions
3	Giving time to think
4	Providing feedback
	Explaining Skills
1	Conformity of material presentation with indicators

2	Emphasis on the main things in learning
3	Providing appropriate examples
4	Use of sentences in videos
	Ability to Use Learning Tools/Media
1	Suitability of media to learning material
2	Media helps in increasing understanding
3	Varied and creative media
4	Suitability of media to cognitive level
	Material Use Skills
1	Suitability of material delivery
2	Smooth and systematic delivery of material
3	Language use
	Skills in Procuring Variations
1	Variations in teaching
2	Variations in media use

The digital teaching module product for lower grade mathematics learning practicum was tested using the One Shoot Case Study Design research design which will be used in the effectiveness test. In this development research, 2 data analysis techniques are used, namely quantitative analysis and qualitative analysis. Test effectiveness using the one sample t test. The tcount value obtained is consulted with the ttable value, with a significance level of 5% and degrees of freedom df = n-1. If the ttable value >tcount then H0 is accepted and H1 is rejected. Conversely, if the ttable value <tcount then H0 is rejected and H1 is accepted.

3. RESULT AND DISCUSSION

Result

This research produced a development product in the form of a digital teaching module for low grade mathematics learning practicum. Product creation uses the Microsoft Office Word software application and the Canva application, which is a graphic design application used to create documents, visual content and others. The digital teaching module can be accessed via the flipbook page and the practical steps can be accessed via the link and QR code contained in the digital teaching module. The digital teaching module product developed consists of 21 pages. Presentation of material in the digital teaching module for lower grade mathematics learning practicum. Presenting interesting practical videos will be able to increase PGSD students' interest and motivation in learning. Several pictures of the teaching modules are presented below Figure 1.

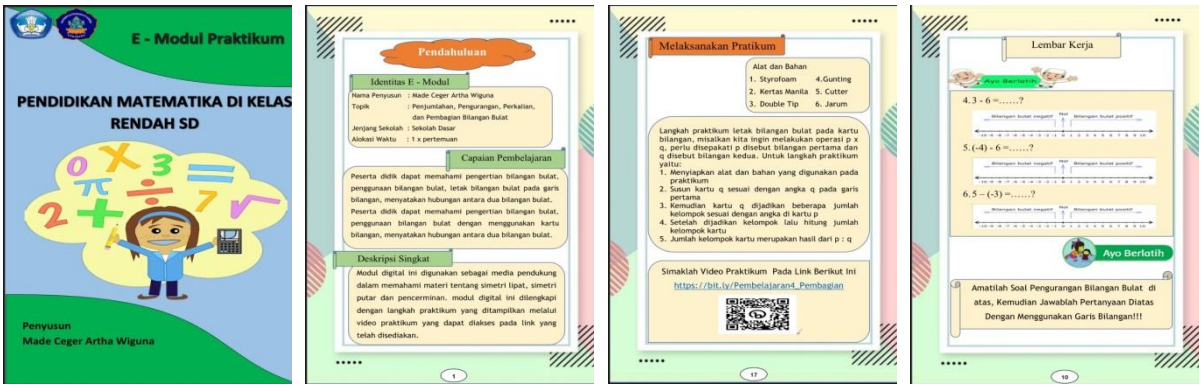

Figure 1. Media Development Results

Validity testing in this development research is viewed from three main aspects, namely (1) testing the validity of teaching modules according to learning material experts; (2) testing the validity of teaching modules according to learning design experts; and (3) testing the validity of teaching modules according to learning media experts. The recapitulation of the results of the validity assessment of learning tools is presented inTable 6.

Table 6. Results of Teaching Module Validity Analysis

Item	Expert Validity Index			AverageValidity	Validity Qualification
	Contents	Media	Design		
1-45	0.90	0.86	0.96	0.90%	Tall

Based on the Table 7, the results of the validity of the digital teaching module for low grade mathematics learning practicum to improve teaching skills are very high. Practicality testing in this research is seen from the perspective of lecturers as learning practitioners and students as users of digital teaching modules for lower grade mathematics learning practicum which is reviewed through individual trials filling in practitioner response questionnaire sheets. Practitioner testing is assessed by 2 practitioners. The practicality of digital teaching modules for low grade mathematics learning practicum generally obtained assessment results with very good qualifications, namely obtaining a practicality score percentage of 87.95% with very good qualifications. Hypothesis testing in this research was carried out using a one sample t test. However, before that, a prerequisite test is carried out first, namely the normality test of the data distribution. The results of the data normality test show a significance value of 0.345 in the Shapiro Wilk column, so that the data is normally distributed and can be continued with the one sample t test analysis. The results of the one sample t test analysis are presented inTable 7.

Table 7. T-test Test Results

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Rating Result	5.33	24	0.00	4.04	2.48	5.60

The test value used was 80 because the researchers compared the average score for teaching skills with a score of 80 which is the standard for good student teaching skills. Based on the calculation results above, the tcount is 5.328. The tcount value obtained was consulted with the ttable value with a significance level of 5% and the degree of freedom df = n-1, and the ttable value obtained was 2.064. So that the value of ttable < tcount then H0 is rejected and H1 is accepted. Therefore, it can be concluded that the use of digital teaching modules for lower grade mathematics learning practicum is effective in improving PGSD students' Mathematics teaching skills.

Discussion

This development research resulted in a development product in the form of a digital teaching module for low-grade mathematics learning practicum which has been tested for validity, practicality and effectiveness. This development product is designed to improve the teaching skills of PGSD students in lower-grade Mathematics learning content.In this development research, we took a Low Grade Mathematics Education course specifically on addition, subtraction, division and multiplication of integers. The digital practicum teaching module developed contains practicum steps which are presented in the form of practicum videos. Students can easily understand the learning material because the modules developed are easy to understand and can improve their teaching skills by following the practical steps presented in the teaching module. The use of digital teaching modules for lower grade mathematics learning practicums is effective in improving the mathematics teaching skills of PGSD students. This is in line with previous research, namely that the use of teaching modules in mathematics learning can help in the learning process so that it is useful in improving mathematics learning (Marsitin et al., 2018; Supardi et al., 2019). The teaching module product development process was developed using the ADDIE development model. This model was chosen becausearranged in systematic and easy to understand stages of activity (Masturah, et al., 2018; Pratiwi, 2017).

Judging from the aspectthe learning materials, teaching modules developed are qualified as very good as evidenced by the distribution of scores obtained between a score of 5 (very good) and a score of 4 (good). A good learning e-module has several characteristics, namely self-instruction, self-contained, adaptive and user friendly (Sari, 2022; Wulansari et al., 2018). And in this research, the assessment criteria according to material experts were assessed from the aspects of self-instruction, self-contained, adaptive, and user friendly. The self-instruction aspect meets the criteria for being very feasible. The self contained aspect meets the very feasible criteria. The adaptive aspect meets the very feasible criteria. The user friendly aspect meets the very appropriate criteria. E-module is a learning module which is presented using electronic media. So the characteristics of the E-module are the same as the characteristics of the module, namely, self-instruction, self-contained, adaptive and user friendly (Rahman, 2022a; Syafa et al., 2022).

Judging from the learning media aspect, the teaching modules developed are very well qualified and have very high validity. This is evident from the score obtained between a score of 5 (very good) and a score of 4 (good). The criteria assessed in this aspect of learning media are appearance, media presentation and visuals. These three aspects of assessment have a very high percentage of validity of learning media. Accuracy(Istikomah et al., 2020; Lestari & Parmiti, 2020; Susanti & Sholihah, 2021). When selecting teaching module design aspects, product development is also taken into account(Diantari et al., 2018; Lestari & Parmiti, 2020). The creation of cover designs, background colors and the selection of images in teaching materials as well as the layout of images or text are given great attention so that these teaching materials are very well qualified and worthy of implementation. Determination in providing visual presentations will influence students' motivation and interest in learning (Fitriyani, 2019; Zuhdi et al., 2021).

Judging from the learning design aspect, the teaching module developed is qualified as very good, as evidenced by the distribution of scores obtained between scores of 5 (very good) and 4 (good). The criteria assessed in the learning design aspect are learning outcomes, student characteristics, and method aspects(Dwi Lestari & Putu Parmiti, 2020; Fahmi et al., 2021). These three aspects of assessment received a very high percentage of learning design experts. Learning design should consider a learner-centered learning approach, where learners influence content, material activities, and learning phases (Widiana & Wardani, 2017; Yaumi, 2017).

Judging from the aspect of practicality and effectiveness, the use of this practical digital teaching module is able to make it easier for practitioners to explain mathematical material and display practical videos needed to understand the topic of integers. By mastering the practical steps for adding integers, subtracting integers, multiplying integers and also dividing integers, students will be able to implement them when teaching elementary school students in the future. The limitation of this research is that the teaching module was developed based on the characteristics of lower grade elementary school students and the material presented in this digital teaching module is limited to the subject matter of lower grade mathematics lessons and is only given to PGSD students. It is hoped that the results of this research will have implications for the development of the educational sector.

4. CONCLUSION

The development of digital teaching modules for lower grade mathematics learning practicum which were developed using the ADDIE development model has produced products that are valid, practical and effective in improving the mathematics teaching skills of PGSD students. It was concluded that the digital teaching module for practical mathematics learning was suitable for use in learning. It is recommended for students who use the lower class mathematics teaching module well. It is recommended that this teaching module be used as a digital teaching module that can be used in the learning process. It is recommended to be used as a reference if you want to develop similar media.

5. REFERENCES

Abdullah, R. (2017). Learning from the Perspective of Teacher Creativity in the Use of Learning Media. Lanthanide Journal, 4(1), 35–49. https://doi.org/http://dx.doi.org/10.22373/lj.v4i1.1866.

Andiyanto, T. (2018). Concept of Prenatal, Postnatal and Lifelong Education. Elementary: Scientific Journal of Elementary Education, 4(2), 195–204.

Anisa, FW, Fusilat, LA, & Anggraini, IT (2020). Learning Process in Elementary Schools. Archipelago, 2(1), 158–163.

Arini, NM, & Sudatha, IGW (2023). Teaching Materials for Social Sciences Content Using a Heutagogy Approach Based on Local Balinese Wisdom, Subak System. Scientific Journal of Teacher Professional Education. https://doi.org/https://doi.org/10.23887/jippg.v5i3.57798.

Cahyadi, RAH (2019). Development of Teaching Materials Based on the Addie Model. Halaqa: Islamic Education Journal, 3(1), 35. https://doi.org/10.21070/halaqa.v3i1.2124.

Diantari, LPE, Damayanthi, LPE, Sugihartini, NS, & Wirawan, IMA (2018). Development of mastery learning-based e-modules for class XI KKPI subjects. National Journal of Informatics Engineering Education: JANAPATI, 7(1), 33–47. https://doi.org/10.23887/janapati.v7i1.12166.

Dwi Lestari, H., & Putu Parmiti, DPP (2020). Development of Science E-Modules Containing Online Tests to Improve Learning Outcomes. Journal of Educational Technology, 4(1), 73. https://doi.org/10.23887/jet.v4i1.24095.

Dwiqi, GCS, Sudatha, IGW, & Sukmana, AIWIY (2020). Development of Interactive Multimedia Learning for Science Subjects for Class V Elementary School Students. Undiksha Edutech Journal, 8(2), 33.

https://doi.org/10.23887/jeu.v8i2.28934.
Elvarita, A., Iriani, T., & Handoyo, SS (2020). Development of E-Module Based Soil Mechanics Teaching Materials in the Building Engineering Education Study Program, Jakarta State University. Journal of Civil Engineering Education (JPenSil), 9(1), 1–7. https://doi.org/10.21009/jpensil.v9i1.11987.
Fahmi, AN, Yusuf, M., & Muchtarom, M. (2021). Integration of Technology in Learning Activities: E-Module on Islamic Religious Education Learning for Vocational High School Students. Journal of Educational Technology, 5(2), 282–290. https://doi.org/10.23887/jet.v5i2.35313.
Fakhrurrazi, F. (2018). The Nature of Effective Learning. At-Tafkir, 11(1), 85–99. https://doi.org/10.32505/at.v11i1.529
Febriana, R., Yusri, R., & Delyana, H. (2020). Problem Based Learning Space Geometry Module on Problem Solving Creativity. AKSIOMA: Journal of Mathematics Education Study Program, 9(1), 93. https://doi.org/10.24127/ajpm.v9i1.2591.
Feriyanti, N., Hidayat, S., & Asmawati, L. (2019). Development of Mathematics E-modules for Elementary Students. JTPPm (Journal of Educational and Learning Technology): Edutech and Instructional Research Journal, 6(1).
Fitriyani, N. (2019). Development of Powtoon Audio-Visual Learning Media About Self-Concept in Group Guidance for Elementary School Students. Tunas Bangsa Journal, 6(1), 104–114.
Florentina Turnip, R., & Karyono, H. (2021). Development of Mathematics E-modules to Improve Critical Thinking Skills. Journal of Mathematics and Science Education), 9(2), 485–498. https://doi.org/10.25273/jems.v9i2.11057.
Hignasari, LV, & Diputra, GNO (2021). Development of a HOTS (High Order Thinking Skill) Based Learning Evaluation Instrument in View of Mathematical Problem Solving Ability at Higher Education Level. JIIP-Scientific Journal of Educational Sciences, 4(7), 715–724. https://doi.org/10.54371/jiip.v4i7.337.
Hutabarat, PM (2020). Development of Podcasts as a Digital-Based Learning Supplement Media in Higher Education. Journal of Applied Social Humanities, 2(2).
Idiajir, K., & Daryati, RS (2021). Development of E-Module Based Learning in Soil Mechanics Practice Course Development of E-Module Media-Based Learning in Soil Mechanics Practice Course. Pencil Journal: Civil Engineering Education, 10, 89–95. https://doi.org/10.31004/cendekia.v5i3.467.
Irawati, AE, & Setyadi, D. (2021). Development of a Mathematics E-Module on Android-Based Comparative Material. Scholar's Journal: Journal of Mathematics Education, 5(3), 3148–3159.
Istikomah, I., Purwoko, RY, & Nugraheni, P. (2020). Sigil: Development of a Realistic Based E-Module on Circle Material for Class VIII Middle School Students. JP3M (Journal of Mathematics Education and Teaching Research), 6(2), 91–98. https://doi.org/10.37058/jp3m.v6i2.1957.
Juwantara, RA (2019). Analysis of Piaget's Theory of Cognitive Development at the Concrete Operational Stage of Children 7-12 Years in Mathematics Learning. Scientific Journal of Madrasah Ibtidaiyah Teacher Education, 9(1), 27–34. https://doi.org/10.18592/aladzkapgmi.v9i1.3011.
Kuncahyono. (2018). Development of E-Modules (Digital Modules) in Thematic Learning in Elementary Schools. JMIE (Journal of Madrasah Ibtidaiyah Education), 2(2), 219–231. https://doi.org/10.32934/jmie.v2i2.75.
Kusrini, S. (2018). Efforts to Improve Mathematics Learning Outcomes through Combining the Drill Method and Demonstration for Class IB MIN Wonosari Students for the 2016/2017 Academic Year. Journal of Madrasah Education, 3(1), 15–26. https://doi.org/10.14421/jpm.2018.31-02.
Lestari, HD, & Parmiti, DPPP (2020). Development of Science E-Modules Containing Online Tests to Improve Learning Outcomes. Journal of Educational Technology, 4(1), 73–79. https://doi.org/10.23887/jet.v4i1.24095.
Mansur, N. (2017). Application of Teaching Skills in Efforts to Achieve Student Learning Outcomes. Lanthanide Journal, 4(2), 118–127. https://doi.org/10.22373/lj.v4i2.1884.
Marinda, L. (2020). Jean Piaget's Theory of Cognitive Development and Its Problems in Elementary School Age Children. An-Nisa': Journal of Women and Islamic Studies, 13(1), 116–152. https://doi.org/10.35719/annisa.v13i1.26.
Marsitin, R., Sesanti, NR, & Agustina, R. (2018). IT Training Through Creating Mathematics E-modules for Malang Regency Vocational School Mathematics Teachers. Abdimas: Journal of Community Service, Merdeka University of Malang, 3. https://doi.org/10.26905/abdimas.v3i0.2647.
Masturah, ED, Mahadewi, LPP, & Simamora, AH (2018). Development of Pop-Up Book Learning Media in Science Subjects for Class III Elementary Schools. Ganesha University of Education EDUTECH Journal, 6(2), 212–221. https://doi.org/10.23887/jeu.v6i2.20294.
Maudiarti, S. (2018). Application of E-Learning in Higher Education. Educational Science Perspectives, 32(1), 51–66. https://doi.org/10.21009/pip.321.7.

Monawati, M., & Fauzi, F. (2018). The Relationship between Teacher Teaching Creativity and Student Learning Achievement. Journal of Basic Charm, 6(2). https://doi.org/10.24815/pear.v6i2.12195.

Mulyadi, DU, & Wahyuni, S. (2016). Development of Flash Flipbook Media to Improve Students' Creative Thinking Skills in Science Learning in Middle Schools. Journal of physics learning, 4(4), 296–301.

Nabillah, T., & Abadi, AP (2020). Factors Causing Low Student Learning Outcomes. Sessionomadika Proceedings, 2(1c).

Nesri, FDP, & Kristanto, YD (2020). Development of Technology-Assisted Teaching Modules to Develop Students' 21st Century Skills. AKSIOMA: Journal of the Mathematics Education Study Program, 9(3), 480–492. https://doi.org/10.24127/ajpm.v9i3.2925.

Ningrum, E. (2016). Human Resources Development in the Education Sector. Geography Journal, 9(1). https://doi.org/10.17509/gea.v9i1.1681.

Nurmeidina, R., Lazwardi, A., & Ariyanti, I. (2020). Development of an Opportunity Theory Module to Improve Learning Outcomes and Mathematical Disposition. AKSIOMA: Journal of the Mathematics Education Study Program, 9(2), 440–450. https://doi.org/10.24127/ajpm.v9i2.2824.

Oktaviara, RA, & Pahlevi, T. (2019). Development of E-modules Assisted by Kvisoft Flipbook Maker Based on a Scientific Approach to Material Implementing the Operation of Word Processing Applications for Class X OTKP 3 SMKN 2 Blitar. Journal of Office Administration Education, 7(3), 60–65.

Pane, A., & Darwis Dasopang, M. (2017). Learning And Learning. FITRAH:Journal of Islamic Sciences Studies, 3(2), 333. https://doi.org/10.24952/fitrah.v3i2.945.

Pristiwanti, D., Badariah, B., Hidayat, S., & Dewi, RS (2022). Understanding Education. Journal of Education and Counseling (JPDK), 4(6), 7911–7915. https://doi.org/10.31004/jpdk.v4i6.9498.

Rahman. (2022a). Effectiveness of Implementing the Flipped Classroom in Distance Learning at Sma Negeri 9 Makassar. Journal of Biogeneration, 7(1), 40–49. https://doi.org/https://doi.org/10.30605/biogeneration.v7i1.1646.

Rahman, S. (2022b). The Importance of Learning Motivation in Improving Learning Outcomes. Proceedings of the National Seminar on Basic Education.

Ratriana, D., Purwoko, RY, & Yuzianah, D. (2021). Development of an Ethnomathematics-Based E-module that Explores Islamic Values and Culture for Middle School Students. AlphaMath: Journal of Mathematics Education, 7(1), 11–19. https://doi.org/10.30595/alphamath.v7i1.8498.

Rohmah, AN (2017). Learning and Learning (Basic Education). Scholar, 9(02), 193–210. https://doi.org/10.37850/cendekia.v9i02.106.

Rohman, MG, & Susilo, PH (2019). The Role of Teachers in Using Learning Media Based on Information and Communication Technology (ICT) Case Study at the Muslimat Nu Maslakul Huda Kindergarten. Journal of Reform, 8(1), 173. https://doi.org/10.30736/rfma.v8i1.140.

Sari, W. (2022). Development of a Mathematics E-Module Based on Contextual Problems Integrated with Ancient Values for Class VIII at SMP IT Qurrata A'yun Sungayang.

Sholihah, I., & Firdaus, Z. (2019). Improving the Quality of Human Resources through Education. Al-Hikmah Journal, 7(2), 33–46.

Sirait, J.E. (2021). Analysis of the Influence of Teacher Competency on Learning Success at Bethel Tanjung Priok Elementary School, North Jakarta. Diegesis: A Journal of Theology, 6(1), 49–69.

Supardi, AA, Gusmania, Y., & Amelia, F. (2019). Development of a Mathematics Learning Module Based on a Constructivist Approach to Logarithm Material. AKSIOMA: Journal of Mathematics and Mathematics Education, 10(1), 80–92. https://doi.org/https://doi.org/10.26877/aks.v10i1.3744.

Susanti, ED, & Sholihah, U. (2021). Development of an E-Module Based on Corporate Flip Pdf on the Material of Area and Volume of a Ball. RANGE: Journal of Mathematics Education, 3(1), 37–46. https://doi.org/10.32938/jpm.v3i1.1275.

Syafa, IP, Putri, M., Setiawati, NZE, & Marini, A. (2022). The Influence of E-Module Based Literacy Learning Media on the Character Formation of Elementary School Students (Literature Study). Journal of Basic Education and Social Humanities, 2(2), 313–328. https://doi.org/10.53625/jpdsh.v2i2.4228.

Syahputri, N. (2018). Design and Development of Grade 1 Elementary School Mathematics Learning Media Using the Demonstration Method. JSIK (Kaputama Information Systems Journal), 2(1), 89–95. https://doi.org/10.33365/jatika.v3i3.2416.

Syofyan, H. (2018). Analysis of Learning Styles and Achievement Motivation on Science Learning Outcomes. Eduscience Journal, 3(2), 76–85. https://doi.org/10.47007/edu.v3i2.2506.

Wahid, A. (2018). Journal of the Importance of Learning Media in Improving Learning Achievement. Istiqra: Journal of Islamic Education and Thought, 5(2).

Widiana, GT, & Wardani, IK (2017). Effectiveness of Science Teaching Material Supplements with a Scientific Approach for Fourth Grade Elementary School Students. Indonesian Journal of Basic Education, 3(1), 41–55.

Wulansari, EW, Kantun, S., & Suharso, P. (2018). Development of an Economic Learning E-Module on Capital Market Material for Class Xi Ips Man 1 Jember Students for the 2016/2017 Academic Year. JOURNAL OF ECONOMIC EDUCATION: Scientific Journal of Educational Sciences, Economic Sciences and Social Sciences, 12(1), 1. https://doi.org/10.19184/jpe.v12i1.6463.

Yaumi, M. (2017). Learning Design Principles: Adapted to the 2013 Curriculum. Kencana. https://doi.org/https://doi.org/10.19184/jpe.v12i1.6463.

Yuni, E., Dwi, W.;, Sudjimat, A., & Nyoto, A. (2016). Transformation of 21st Century Education as a Demand for Human Resource Development in the Global Era. Proceedings of the 2016 National Mathematics Education Seminar, 263–278.

Zahwa, FA, & Syafi'i, I. (2022). Selection of Information Technology Based Learning Media Development. Equilibrium: Journal of Educational and Economic Research, 19(01), 61–78. https://doi.org/10.25134/equi.v19i01.3963.

Zuhdi, A., Firman, F., & Ahmad, R. (2021). The importance of education for humans. SCHOULID: Indonesian Journal of School Counselling, 6(1), 22. https://doi.org/10.23916/08742011.