

DEVELOPING DIGITAL TEACHING MODULE OF SOCIAL-SCIENCE SUBJECT BASED STEAM METHOD FOR GRADE FOUR ELEMENTARY SCHOOL STUDENTS

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Abstract. Digital learning modules continue the trend for future literacy modules. The covid 19 pandemic, which has paralyzed practically all sectors of economic and educationally life, has played a role in accelerating to use of digital learning modules. Student are forced to study individually from home using digital platforms. A digital modules is a digital book expected to enable students to study independently, with or without a facilitator. This research aims to develop a digital learning module on STEAM based method science-social subjects for 4th graders. This research used the EDDIE development model, which consists of five phases; analyze, design, implementation and evaluate. The characteristic of digital learning modules include five parts; components, displys, materials, learning activities and research systems. Content validation used the Gregory formula with the results of the validity test classifiled as valid; material and media feasibility test used LORI formula with test results included

in the very feasible category; practically testing used the User Experience Questions (UEQ) questionnaire method with test results included in the excellent or very hight category; and the effectiveness of the product was tested using an assessment in the form of essay with everage student score of 82.4, which is includee in the 90% completeness category. The development of digital teaching modules aims to improve students' ability to understands STEAM based method on social-science subjects, increase student achievement in practicing module materials in the form of literacy and numeracy through worksheet and projects activities, and improve students's ability in digital technology teaching module independently, which are easy to use anytime-anywhere.

INTRODUCTIONS

Pandemic of covid 19 given a momentum that were turning on online study which push students and teacher to learn have to use technology media to keep running the wheel of Indonesian education. Education is one assets that can support the progress of the nation (Meylani, 2022). The teacher is the main instrument in education process. Teacher are expected to have ability to design learning programs and manage classes so that student can learn and reach maturity levels as the ultimate goal of the educational process (Yuanita, 2019). In today digital era, creative teachers will continue to innovate knowledge by developing and experimenting with learning method or technical study. Teacher's ability and creativity to use

modern tools such as social media, mobile technology, gadgets, and other resources then communicating with technology devices in learning. Technology is a tool that can help teachers carry out the learning process (Kristiantari, 2015 & Gettings, 2016)). The learning media used by a teacher must, of course, be able to make it easier for information to be conveyed to students, especially the media used is easy to carry and not easily damaged, such as electronic modules (Logan et al, 2021). Developing digital module can give a new style of teaching. During Covid 19 pandemic, digital module become best solutions to keep education process continuous between student and teacher from their own home.

The implementation of 2013 Curriculum in Indonesia for Elementary level is carried out through an integrated thematic approach which is characterized by the incorporation of several subject matters content into themes or subthemes (Rindarti, 2021). Which it would be difficult to be done during pandemic Covid 19, then Indonesian Education department released Merdeka Curriculum which is grade fourth of Elementary school were form into B Faces. Grade fourth student characterized of Z generation or millennial people which can be seen really close to digitalism world. The digital media have extended their reach into mundane heart of everyday life, most visibly with cell phones, gadgets now vital to conduct business affairs in remote areas of the world, as well as in bustling global cities (Coleman, 2010). Module with Digital form would be easier to used for student. The electronic module is used as a learning medium and learning guide for a subject that is coupled with technology (Wirama, 2022). Developing Digital module given an opportunity to student learn independently from any resources anytime and anywhere.

Merdeka Curriculum is current curriculum after Pandemic Covid 19, then brought new subject for upper class in Elementary school called IPAS (IPA dan IPS) or social-science subject which is combined science and social subject. Science is very important to elementary school students. Through science, students are taught to get to know their surroundings. Science is also natural science, where nature has meaning related to nature. Science also has the meaning of science (Nurwulan, 2020 & Kristiantarti, 2015). Science is knowledge learned from natural phenomena in the form of facts, concepts or principles from experiments of observations to conclude (Diawati, 2019). Science learning emphasizes providing direct experience to develop competencies to explore and understand the natural surroundings scientifically. It direct to find out and do something to help students understand the natural surrounding (Evitasari & Nurjanah, 2019). Social learning conduct the student understanding to be part of society surrounding. Student understand that live.

STEAM based method (Science, Technology, Engineering, Arts, and Mathematics) has several benefits. Students can use knowledge and skills from all subjects to support project work. Students are encouraged to recognize and respect their own and others 'skills and interests. Students are taught to adapt themselves to the people around them as a team form according to their respective roles (Apriliansa et al., 2018 & Widana, et al., 2021). The advantages of STEAM shows positive results in scientific knowledge, the STEAM approach teaches students to think actively, creatively, and innovatively solve problems, through technology students can create their ideas into the latest technology, the STEAM approach can bridge abstract concepts mathematically into science, technology, inquiry, and Art (Arisantiani et al., 2017).

The purpose of using the module as teaching material is that the character in students will be formed. Many previous studies have discussed teaching materials that are effective and efficient in learning. The findings of previous studies also stated that digital modules could

help students learn (Rasmussen et al., 2020). The modules form in STEAM form combine 5 knowledge which are Science, Technology, Engineering, Arts, and Mathematic in digitally product (Ana, et al., 2021). This research developing product of digital module of social-science or IPAS with STEAM based method for fourth grader of Elementary school. The topic was about plants as source of life on Earth. STEAM based method took integrated subject on literacy and numeracy in social and science with in student assessment of math, art and engineering as student project programed.

METHOD

This development research uses the ADDIE model. This model consists of 5 stages, namely: Analysis, Design, Development, Implementation and Evaluation. 1) Analysis. The purpose of this analysis stage is to find out need to develop digital teaching modules, observe the condition of learning facilities, and to determine the suitability of the curriculum. After the revision was carried out using formative evaluation calculation according to Gregory (Lestari et al., 2022) with the following mechanism; (1) Experts who are trusted in evaluating per-item instruments, by assigning values that are relevant or irrelevant, (2) the results of the assessment of the experts are tabulated in the form of matrix, (3) Cross tabulation, (4) Calculation of content validity using the Gregory formulas, as the follow: $CV = \frac{D}{A+B+C+D}$. 2) At the design stage, it is carried out by making a teaching module design that discusses the general description of making the module and an overview of the resulting teaching modules. 3) The development stage, is the initial product development stage of the teaching module and the expert assessment stage, which is as follows; (1) design development and applications, the product framework design that has been made is then implemented into the initial teaching module product, (2) Expert assessment, this stage is useful to determine the feasibility of the learning media develop and to get product improvement suggestions. The assessment was carried out by material experts and media experts. The evaluation questionnaire for material experts and media experts. The evaluation questionnaire for material experts and media experts used in this study was use the LORI assessment questionnaire. 4) Product implementation for students is carried out directly by practicing the activities in the digital module independently, starting form understanding literacy and numeracy materials, working on worksheets and project activities ending with answering assessment assignments as a test of effectiveness. Practicality testing was also carried out through a User Experience Questions (UEO) questionnaire. 5) Evaluation was carried out by analysing the results of the practicality and effectiveness test that had been carried out.

RESULT AND DISCUSSION

Result

The application of developing module given results according to research method that was taken, which are 5 steps to follow; 1) analyze, where this steps analyze content of the module. This step taken by give direct interviews with teachers of fourth grade at SDN 1,2,3 Guwang in Gianyar with in 10 questions. It's would be included in digital teaching module and topic taken about plants as the source of life on Earth. The content validation of ten teaching module content given by 2 teacher with results reliance in following table.

Table 1. The content validity of digital teaching module materials of social-science subjects

No.	Material	Teacher 1	Teacher 2
1	Parts of Plants	Relevant	Relevant
2	Photosynthesis Process	Relevant	Relevant
3	Plants Breeding	Relevant	Relevant
4	Subak Concept in Bali	Relevant	Relevant

No.	Material	Teacher 1	Teacher 2
5	Project activity of Hydroponic	Relevant	Relevant
6	Hydroponic project using recycle materials	Relevant	Relevant
7	Eco printing Project	Relevant	Relevant
8	Activity making Eco printing	Relevant	Relevant
9	Counting water Debit	Relevant	Relevant
10	Practical counting of water debit	Relevant	Relevant
Content Validity			1

According to Table 1, there are 10 material presented, 10 content and relevance material provide by the two validators, then the results of the table are analysed with the Gregory formula and the results of the content validity value are 1 that means it have very high content validity. The design stage or the design of digital modules that are in accordance with the content of the module material based on the results of the content validation that has been tested. At this stage digital applications are also designed to load the contents of the teaching modules. The development stage produces the initial product in the form of a digital science module for science subjects based on the STEAM method for grade IV Elementary School. Furthermore, the validity of the materials and learning media was tested by material and media experts from the UNDIKSHA post graduate teaching lectures with LORI instrument. The following table shows the results of the LORI instrument on the material and media validity test of digital teaching module.

Table 2. Material and Media Validity LORI test

No.	Item	Value	Category
1	Content Quality	5	Very Worthy
2	Learning Purpose	4,75	Very Worthy
3	Feedback and adaptation	5	Very Worthy
4	Motivation	5	Very Worthy
Mean		4,9	Very Worthy

Table 3. Media Feasibility Validity Test as a Digital Teaching Module With LORI

No.	Item	Value	Category
1	Presentation Design	4,5	Very Worthy
2	User Interaction	4,48	Very Worthy
3	Accessibility	4,5	Very Worthy
4	Reuse	5	Very Worthy
5	Standard compliment	4	Worthy
Mean		4,49	Very Worthy

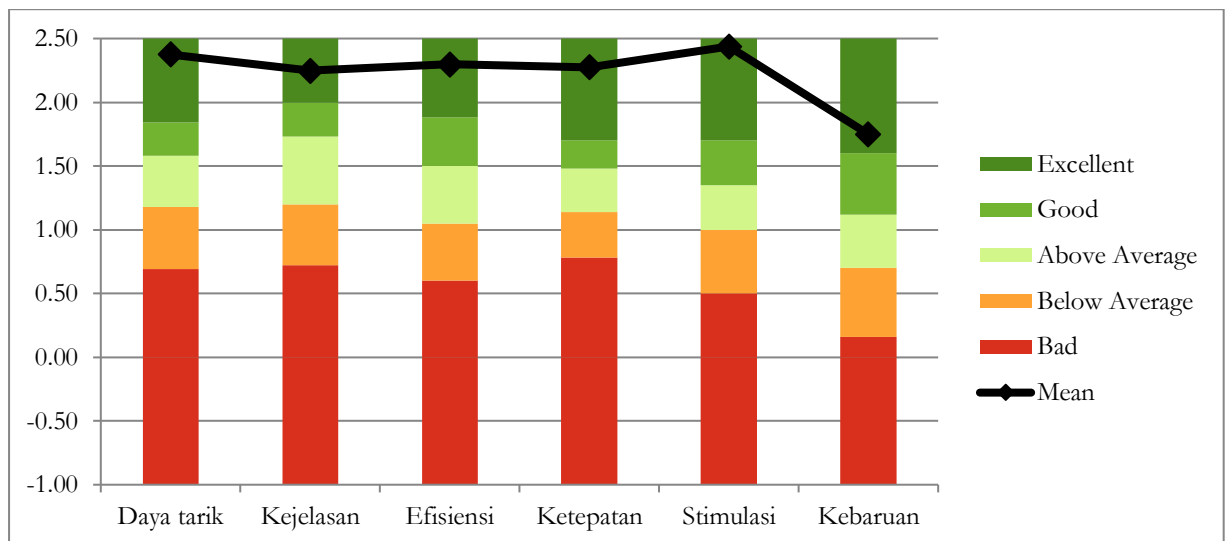
Based on Table 2, the results of the development validity test with the content quality aspect items are worth 5 with a very feasible category, the learning objectives aspect is worth 4.75 with a very feasible category, the feedback and adaptation aspects are worth 5 including the very feasible category and the motivational aspect is worth 5 including the very feasible category. In the entire material validation test by experts it produces a value of 4.9 which is included in the very decent category. In table 4.3. it can be seen that the aspect of media development gets a score of 4.5 with a very worthy category, the aspect of user interaction gets a score of 4.48 with a very feasible category, the

accessibility aspect gets a score of 4.5 with a very feasible category, the reuse aspect gets a score of 5 with a very feasible category and the aspect of meeting the standard gets a score of 4 with a worthy category. In general, the average value of the media aspect is 4.49 with a very worthy category.

In the Implementation Stage, digital teaching modules were implemented, then practical tests were carried out on students and teachers at SDN 1,2,3 Guwang with the User Experience Questionnaire (UEQ) instrument. The following test results are presented in the form of tables and diagrams below:

Table 4. Practicality Test Results With *User Experience Questioner* (UEQ) Methods

Scale	Mean	Comparisson to benchmark	Interpretation
Attractiveness	2.38	Excellent	In the range of the 10% best results
Clarity	2.25	Excellent	In the range of the 10% best results
Efficiency	2.30	Excellent	In the range of the 10% best results
Accuracy	2.28	Excellent	In the range of the 10% best results
Stimulation	2.44	Excellent	In the range of the 10% best results
Novelty	1.75	Excellent	In the range of the 10% best results



Picture 1. Practicality Test Diagram With *User Experience Questioner* (UEQ) Methods

In the product implementation stage, an effectiveness test was also carried out using the instrument in the form of an essay to 66 students. It was found that the average score of all students was 82.4. Of the 66 students, there were 6 incomplete students who scored below KKM 70, so the students' classical completeness was 90% on the assessment of learning activities using digital teaching modules for the Science subject, independent curriculum based on the STEAM method. From the analysis of the tables and diagrams that contain the results on the green line, it is included in the excellent category.

Discussion

Based on the results of Developing research of digital teaching modules that used STEAM methods for fourth grader give worthy benefit through student application at SDN 1, 2, 3 Guwang. It was found that this digital module were:

(1) very high content validity. This means according to experts this module that has high score to relevant situation relations to students needs. Despite to the topics about plants as life sources on Earth with materials of hydroponic and Eco printing represents of 5 integrated subject science, math, art technology and social relations. This develop learning tool needs validations of expert who understand and able to measure its needs, concepts, and characteristic of right modules for students at elementary schools. To achieve maximum learning outcomes learners should know about the management of learning media both as a teaching tools and as a support for material or content of the lesson more clearly and easily can be mastered by students (Fauzan & Arifin, 2019). A digital media developed on the topic of learning are declared valid and suitable for used in student learning (Jayantika & Namur, 2022). As result its given really relevant with students needs.

2) Very Worthy. According to material and media experts, can be found that the digital teaching module give very worthy looks and useful for students in elementary school. The looks and practically used for student given validity according to merdeka curriculum.

3) Excellent practical. For method that taken in this research given lots benefits activity content on the modules with STEAM methods. With in student papers, assessment and practical activity students get independently study without teacher facility. Teacher can also develop and enrich students 'learning experiences with the developing of learning approaches that have been adapted to the facts of basic competences that have STEAM potential. STEAM is the one of the educational breakthrough in Indonesia that effectively responds to challenges not only today but also in the future (Anisimova et al., 2020).

4) Effective. This module assessment given very effectively improve student ability at social –science with topic about plants as life sources on Earth. Students also have independent learning with digital modules and study anytime and anywhere they can. STEAM in its interdisciplinary application knowledge (Widana & Septiari, 2021). The STEAM approach can develop student soft skills, namely working together, critical thinking, caring environment, responsibility, adaptability, and creative thinking (Apriliana et al., 2018) which all conduct on this developing research of digital teaching module in social-science subject with STEAM based method for fourth grader on elementary school.

CONCLUSION

The characteristics of digital teaching modules with 5 aspects presented are: components, appearance, materials, learning activities and assessments. The appearance of the teaching module is developed according to the characteristics of the module, namely self-instruction, self-contained, stand-alone, adaptive, and user-friendly. Then the material displayed is based on the STEAM-based method with 10 material contents, namely understanding the parts of plants, the process of photosynthesis, understanding plant reproduction, understanding the concept of Subak in Bali, understanding planting plants and hydroponic project activities, understanding how to make patterned cloth plants with Eco print techniques and projects for making Eco prints, and learning numeracy by calculating water discharge. Activities with STEAM-based methods through learning integration in the form of scientific literacy, social literacy, numeracy, worksheets, project activities and assessments with C4-C6 cognitive levels. Assessment system with an essay question assessment of 10 questions.

The digital teaching module developed is very valid, both in terms of content, material and activities in it with a CV score of 1 which means it is included in the very valid category. The validity of the eligibility of digital teaching modules was carried out on the test of material experts and media experts where the topic of discussion was plants, the source of life on Earth. The score on the material expert test has an average score of 4.9 and is included in the very decent category. Then in the media expert test with an average value of 4.49 which is included in the very feasible category. The practicality of the STEAM-based digital science teaching module developed is included in the very practical category. The practicality test was carried out by 68 respondents consisting of 3 teachers and 65 students at SDN 1, 2, 3 Guwang. There are 6 qualifying factors where all the factors after being tested show a very good rating. The effectiveness of the digital teaching modules developed is very effective. This can be seen from the results of student assessments with 10 essay questions at cognitive level C4-C6. From the value analysis it was found that the average student score was 82.4 and the completeness level was 90%.

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