Elementary School Science Skills Practical Digital Teaching Module

Ni Kadek Anggi Pratiwi[1*], I Nyoman Laba Jayanta[2] iD

[1,2] Basic Education, Primary School Teacher Education, Ganesha University of Education, Singaraja, Indonesia

A R T I C L E   I N F O

A B S T R A K

Belum adanya modul ajar digital yang digunakan dalam proses pembelajaran keterampilan IPA SD untuk mampu melatih kemampuan belajar secara mandiri. Tujuan penelitian ini adalah untuk menciptakan modul ajar digital praktikum pengembangan keterampilan IPA SD yang valid dan praktis. Model penelitian yang digunakan adalah model penelitian ADDIE. Subjek penelitian ini adalah 6 ahli dan 2 praktisi untuk mengetahui validitas serta kepraktisan modul digital yang dikembangkan. Objek dalam penelitian ini adalah validitas dan kepraktisan modul ajar. Metode pengumpulan data yang digunakan adalah metode kuesioner atau angket. Penelitian pengembangan ini digunakan dua teknik analisis data yaitu teknik analisis deskriptif kualitatif dan teknik analisis deskriptif kuantitatif. Berdasarkan analisis uji validitas dan kepraktisan tersebut, modul ajar digital praktikum pengembangan keterampilan IPA SD memperoleh validitas ahli materi pembelajaran sebesar 96,6 %, ahli desain pembelajaran sebesar 91,3%, ahli media pembelajaran sebesar 95,56%, hasil penilaian kepraktisan dari praktisi sebesar 96%, penilaian kepraktisan pada uj perorangan sebesar 93,3%, dan penilaian kepraktisan pada uji kelompok kecil sebesar 95,56%, secara keseluruhan dengan kualifikasi sangat baik. Simpulan penelitian modul ajar digital praktikum pengembangan keterampilan IPA SD dinyatakan valid dan praktis dengan kualifikasi sangat baik. Implikasi dari penelitian ini adalah mahasiswa dapat lebih mudah dalam melaksanakan praktikum dan mampu belajar secara mandiri.

A B S T R A C T

There is no digital teaching module used in the learning process of elementary science skills to be able to train the ability to learn independently. This research aims to create a valid and practical digital teaching module for elementary school science skills development practice. The research model used is the ADDIE research model. The subjects of this research were 6 experts and 2 practitioners to determine the validity and practicality of the digital module being developed. The object of this research is the validity and practicality of the teaching module. The data collection method used is the questionnaire method. This development research used two data analysis techniques, namely qualitative descriptive analysis techniques and quantitative descriptive analysis techniques. Based on the validity and practicality test analysis, the digital teaching module practice for developing elementary science skills obtained validity from learning material experts at 96.6%, learning design experts at 91.3%, learning media experts at 95.56%, the results of practicality assessments from practitioners of 96%, the practicality assessment in the individual test was 93.3%, and the practicality assessment in the small group test was 95.56%, overall with very good qualifications. The research conclusions of the digital teaching module practice for developing elementary school science skills were declared valid and practical with very good qualifications. This research implies that students can more easily carry out practicums and can learn independently.

1. INTRODUCTION

The development of science and technology demands quality education (Sihartin, 2021; Widodo et al., 2020). Education is a means of forming character, instilling values and morals, through the process of increasing knowledge and meeting future needs (Cahyono, 2016; Devi Erlistiana et al., 2022). With education, intelligent and noble people will be formed, therefore the role of education is very important for

Corresponding author.
E-mail addresses: anggikta081@email.com (Ni Kadek Anggi Pratiwi)

improving human quality (Darman, 2017; Suwartini, 2017). Basic education is education that continues after family, at the basic education level it is very important to develop attitudes, skills and abilities (Bariyah, 2019; Sugiarto & Farid, 2023). Students in elementary schools will be given learning that will direct students to have problem solving abilities so that it will form students who have critical thinking skills, in this case students will not be given abstract learning but will be given learning that is close to everyday life. their day so they can easily understand what they are learning (Hasnan et al., 2020; Nugraha, 2018). To help students understand the material, creative educators are needed, so that the learning process can be said to be successful (Anggraeni, 2019; Oktiani, 2017).

Basically, education must be viewed from all sides, because education is so important that it is very important to pay attention to it, so that there are no obstacles in its implementation (Aulia & Dewi, 2021; Wintara, 2017). Times that always change from time to time cause differences in human behavior and behavior (Aslan, 2016; Devi Erlistiana et al., 2022). Good education is education that is able to run in accordance with current developments which emphasize a person's mastery of the use of technology. Humans are expected to be able to adapt to technological advances because in the future all human activities today will be related to technology (Ariani & Syahrani, 2022; Nursyifa, 2019). With the development of technology, it can support teaching and learning activities, so that learning tools can be added. One of them is a teaching module, a digital teaching module is a teaching module made on an electronic basis that can be accessed anytime and anywhere, which explains learning material in the form of video, audio and images (Hadiyanti, 2021; Padwa & Erdi, 2021).

However, in reality, the teaching modules used in the teaching and learning process by lecturers are teaching modules which only explain learning material through writing and pictures, whereas with today's very rapid developments, teaching staff should be able to create teaching modules that combine with technology, namely by creating digital teaching modules which explain the material in audio-visual form. This problem has been felt directly by researchers who are currently pursuing undergraduate education at the Ganesha Education University Primary School Teacher Education Study Program. From the problems above, it is very necessary to prepare prospective teaching staff who are professional and ready to make changes in the field of education that are demanded by current developments. In the PGSD study program students will receive many courses which of course will be used as preparation for teaching in elementary schools, one of the courses students receive in the PGSD study program is the elementary science skills development course, this course emphasizes students' skills in implementing practicum to gain the desired knowledge from the material being studied, this course covers several topics in it.

The solution to overcome this problem is by implementing digital teaching modules. Digital teaching modules are digital teaching materials that are systematically arranged and presented in electronic form (Sofyan et al., 2020; Winatha, 2018). Digital teaching modules can increase students' interest and motivation in learning. E-modules have an important role in the learning process which can help teachers explain lesson material (Aryawan et al., 2018; Astra et al., 2020). The advantage of digital teaching modules compared to other print media is that they are interactive (Cubillos et al., 2023). E-modules packaged in digital form can be read via a laptop or computer (Aryawan et al., 2018; Tharmar & Kalidasan, 2019). The E-module is also equipped with facilities such as learning videos, animations, images and audio. The e-module is interactive, making it easier to navigate, displaying images, text and videos equipped with tests and providing feedback automatically. In this way, E-modules can be used as one of the best alternatives to increase students' understanding, so that they can improve students' learning outcomes. Previous research findings state that e-modules can increase students' interest in learning (Ismi, 2019; Simamora et al., 2019). E-modules are suitable for application in the learning process to improve students' critical thinking skills (Rahmat et al., 2020). The difference between this development research and previous research is that it is seen in terms of the material developed, the research location, and the appearance of the digital teaching modules developed. The novelty in the module created in this research is that first, this teaching module was designed based on technological advances by developing digital teaching tools, second, this teaching module was designed based on problems that often occur in higher education, third, the teaching module is only limited to elementary science skills development courses. on the topic of the properties of light. The aim of this research is to create a valid and practical digital teaching module for elementary school science skills development practicum.

2. METHOD

This research uses the ADDIE development model, ADDIE is an abbreviation for Analysis, Design, Development of Production, Implementation or Delivery. The ADDIE model consists of five stages, namely the analysis stage, design stage, development stage, implementation stage and evaluation stagen (Dwiqi et al., 2020; Sholeh, 2019). The ADDIE model consists of five stages, namely analysis (activities analyzing

needs), design (designing teaching material products), development (developing teaching materials that have been designed), implementation (implementing the results of developing teaching materials), and evaluation (evaluation to collect data consisting of from summative and formative evaluation). So, a product that is valid and suitable for use can be produced (Hidayat & Nizar, 2021; Suryaningtyas et al., 2020; Tegeh & Kirna, 2013). The development of this product uses the ADDIE model with the analysis stages by analyzing the material, analyzing digital teaching modules and analyzing student needs, the design stage by determining the material developed in elementary science skills development courses, compiling learning outcomes in the teaching modules, designing and prepare practical steps according to the material, and prepare the assessment instruments used, development stage, at this stage what is done is develop the product that has been designed, then the product developed will be handed over to experts and carried out practitioner tests, individual tests and small group tests , implementation stage, at this stage it is not carried out due to limited time in research, and the final stage is the evaluation stage, this evaluation is carried out to obtain data and information obtained during the ongoing product development process.

The subjects in this research are experts, practitioners (lecturers), and students who provide assessments of the digital teaching modules being developed, while the objects in this research are the validity and practicality of the practicum digital teaching modules being developed. The resulting product is a digital teaching module for elementary school science skills development practicum and tested for validity and practicality. The types of data used in this research are qualitative data and quantitative data. Qualitative data is a type of data created in the form of words in the form of responses, input, criticism and suggestions obtained from the review stage by experts. Quantitative data is data in the form of values obtained from the results of validation sheets for practicum digital teaching modules obtained from experts. The data collection method used in this research is the questionnaire and questionnaire method. A questionnaire is a data collection method that is carried out by giving several written questions to respondents to provide responses according to user requests (Hadiyanti, 2021; Syarifuddin et al., 2021). The grid of instruments used in data collection is presented in Table 1, Table 2, Table 3, Table 4, Table 5, and the validity assessment scale is presented in Table 6.

Table 1. Material Instrument Lattice

No (1)	Aspect (2)	Indicator (3)	Item No (4)	Number of Items (5)
1	Self-instructional (Material)	Clarity of Learning Outcomes (CP)	1,2	2
		The material presented in the module can be understood easily	3,4,5	2
		Learning material is supported by examples and illustrations	6,7,8	2
		Conformity of module content with learning outcomes (CP)	9,10,11	3
		Ease of understanding the language	12	1
2	Self Contained(Presentation of material)	Completeness of the material presented in the module	13	1
3	Adaptive (Adaptation)	The material is made by adapting technology	14	1
4	User friendly(Use)	Ease of use of the module	15	1
		Total		**15**

Table 2. Media Expert Instrument Grid

No (1)	Aspect (2)	Indicator (3)	No. Item (4)	Number of Items (5)
1	Appearance	The attractiveness of the appearance of the teaching modules created	1,2	2
		Appropriate use of letters	3,4	2
		Appropriate use of color	5,6	2
		Material completion	7	1
2	Media presentation	Clarity of presentation of material in teaching modules.	8	1
		The images used are appropriate to the material presented	9,10	2

No (1)	Aspect (2)	Indicator (3)	No. Item (4)	Number of Items (5)
3	Visual	Suitability of teaching module illustrations with learning materials	11	2
		Accuracy of illustrations with student characteristics	12	1
		Layout suitability	13	1
		Background suitability	14	1
		Appropriateness of the type of writing, type of page and material in the teaching module	15	1
		Total		**15**

Table 3. Learning Design Expert Instrument Grid

No (1)	Aspect (2)	Indicator (3)	Item Number (4)	Number of Items (5)
1	Learning outcomes	Formulation learning achievements	1	1
		Clarity of learning outcomes	2	1
		Clarity of learning achievement indicators	3	1
2	Student characteristics	Presentation of material	4	1
		Use of sentences	5	1
		Appropriateness of language use	6	1
		Suitability of the module to learning	7	1
		Color accuracy	8	1
3	Method	Accuracy of learning strategies	9,10	2
		Systematic serving	11	1
		Giving examples	12	1
		Presentation of teaching modules	13, 14, 15	3
		Amount		**16**

Table 4. Practitioner Instrument Grid

No. (1)	Aspect (2)	Indicator (3)	No. Item (4)	Number of Items (5)
1	Presentation of practical digital teaching modules	The technical quality of the media	1, 2, 3, 4, 5	5
2	Quality of practical digital teaching modules	The quality of the material content in the media	6, 7, 8, 9, 10	5
		Clarity of practical steps in the teaching module	11, 12, 13, 14, 15	5
		Total		**15**

Table 5. Individual and Small Group Trial Instrument Grid

No. (1)	Aspect (2)	Indicator (3)	No. Item (4)	Number of Items (5)
1	Presentation of practical digital teaching modules	The technical quality of the media	1, 2, 3,	3
2	Quality of practical digital teaching modules	The quality of the material content in the media	4.5	2
		Clarity of practical steps in the teaching module	6,7,8	3
		Total		**8**

The data analysis method used in this research is qualitative descriptive analysis and quantitative descriptive analysis. The qualitative descriptive analysis method is used to process data resulting from reviews carried out by learning material experts, namely science subject experts, learning media experts

and practitioners. The quantitative descriptive analysis method was used to describe the average score of each science subject expert, learning media expert and practitioner related to the digital practicum teaching module media being developed.

3. RESULT AND DISCUSSION

Results

The development product produced in this research is learning media in the form of digital teaching modules for developing elementary science skills. The teaching module developed presents the topic of the properties of light by containing material descriptions, practical steps, worksheets and practical videos of the properties of light which can help students in the learning process. With the practical video on the properties of light, it will be easier for students to carry out the practical on the properties of light because in the video the practical steps are clearly presented starting from preparing tools and materials until the practical is completed. This product was created with the help of the Canva application. Canva is an application that can be used to design any project. By utilizing the features contained in Canva, you can get various types of themes, images or design your own as creatively as possible. The teaching module developed consists of 23 pages starting from the cover. Several images of products that have been developed are presented below Figure 1.

Figure 1. Digital Teaching Module for Elementary Science Skills Development

Validity testing in this development research is viewed from three main aspects, namely testing the validity of learning tools according to learning material experts, testing the validity of learning tools according to learning design experts, and testing the validity of learning tools according to learning media experts. The recapitulation of the results of the validity assessment of learning tools is presented in Table 6.

Table 6. Results of the Validity Assessment of the Digital Teaching Module for Elementary Science Skills Development

No.	Subject	Validity Percentage Teaching materials	Qualification
1	Learning Materials Expert	96.6 %	Very good
2	Learning Design Expert	91.3 %	Very good
3	Learning Media Expert	92.6 %	Very good

Testing the practicality of individual trials in this research is viewed from the perspective of students who have different abilities. This testing involved three students from the elementary school teacher education study program. The test results are presented in Table 7.

Table 7. Results of Teaching Module Practicality Assessment According to Practitioners

No.	Subject	Validity Percentage Teaching Materials	Qualification
1	Practicality of Teaching Modules According to Practitioners	96%	Very good

No.	Subject	Validity Percentage Teaching Materials	Qualification
2	Practicality of Teaching Modules in Individual Tests	93.3 %	Very good
3	Practicality of Teaching Modules in Small Group Testing	95.56%	Very good

The practicum digital teaching module for elementary science skills development obtained a validity of 96.6% for learning material experts with very good qualifications, 91.3% for learning design experts with very good qualifications, and 95.56% for learning media experts with very good qualifications, so that stated overall has very good validity. The digital teaching module for developing elementary school science skills obtained practicality assessment results from practitioners of 96% with very good qualifications, a practicality assessment on the individual test of 93.3% with very good qualifications, and a practicality assessment on the small group test of 95.56% with qualifications Very good. The practical digital teaching module for developing elementary science skills on the topic of the properties of light is tested for validity and practicality by material experts, media experts, design experts and practitioners (lecturers) using instruments that have been tested for the level of validity of the instrument's content. The scores obtained from experts and practitioners (lecturers) were then analyzed to determine the validity and practicality of the digital teaching module for elementary science skills development practicum. The scores obtained will then be adjusted to a scale of five. The results of the analysis of the validation scores and practicality of the practical digital teaching module for elementary science skills development as a whole were declared valid and practical with very good qualifications.

Discussion

The results of this research show that the practical digital teaching module for elementary school science skills development as a whole is declared valid and practical with very good qualifications. Judging from the material aspect, it is known that the material contained in this learning media falls within the very valid criteria of the structure of the material presented and the appropriateness of the material presented. This is in line with previous research that to determine the appropriateness of the content of the material, things that need to be considered are the suitability of the material description with the competency standards (SK) and Basic Competencies (KD) contained in the subject concerned as well as the accuracy of the material and learning support materials (Kinanti & Sudirman, 2018; Widiana & Wardani, 2017; Wulansari et al., 2018). This practical digital teaching module is only limited to discussing one topic in the elementary science skills development course, namely presenting the topic of the properties of light. Each material description about the properties of light will be presented with practical steps, practical videos and worksheets, so that students will find it easier to carry out practical work and try to prove the properties of light using simple tools and materials through prepared worksheets, with This practicum digital teaching module can encourage students to learn independently.

Judging from the learning media aspect, this teaching module is included in the very good criteria, this is based on an assessment of the appearance, media presentation and visual aspects. Accuracy in selecting display aspects is also considered in the development of this teaching module by making the cover design, background color and selection of images in the teaching module as well as the layout of images or text so that this teaching module has very good qualifications and is worthy of implementation. Determination in providing visual presentations will influence students' motivation and interest in learning (Ahmadi et al., 2021; Fitriyani, 2019). This is in line with the results of previous research which states that a media that is suitable for application in learning should follow the basic rules/principles of media development, which include dimensions of material presentation, choice of typeface, layout, color composition, and others (Rehusisma et al., 2017; Saputra et al., 2020). Judging from the learning design aspect, the teaching modules developed are in the very good category from the aspects of learning outcomes, student characteristics and methods. When preparing teaching modules, you must pay attention to several things such as the presentation of the material and the grammar used in the teaching module. Obtaining excellent qualifications was also due to the clarity of the material presented. Having illustrative images that support the presentation of material can help students understand material concepts and help explain abstract concepts into concrete ones (Jundu et al., 2020; Sholeh, 2019). Apart from that, the material presented in the media has been presented systematically. Systematic material can make it easier for students to construct their understanding of the material being studied (Nadiyah & Faaizah, 2015; Setiyani et al., 2020).

Judging from the practicality of using the teaching module, the qualifications are very good and worthy of implementation. The use of teaching modules in the learning process can clarify the material

presented by and make it easier to explain learning material, especially material for understanding abstract concepts. Apart from that, the use of modules can also provide opportunities to play an active role in the learning process and can increase insight and knowledge (Hapsari et al., 2017; Tinja et al., 2017).

The process of developing teaching modules in this research follows the ADDIE development model. The ADDIE development model is usedBecause each development stage refers to the previous steps, the resulting product is an effective and high-quality product (Bancin et al., 2019; Suryaningtyas et al., 2020). The ADDIE model consists of five stages that are related to one another, namely from the analysis stage, design stage, development stage, implementation stage to evaluation stage (Dwiqi et al., 2020; Sholeh, 2019). In the learning process, using digital practicum teaching modules can make it easier for students to learn independently with the advantage of modules that can be accessed anywhere and at any time, apart from that, it will also be easier for students to carry out practicums, because in the module there are practicum videos that students can watch. before carrying out the practicum. Video as a learning medium is believed to be able to make an abstract concept concrete because it can show accelerated or slowed down motion, besides that, video can show something in detail, making the learning process easier (Hafizah, 2020; Harahap & Siregar, 2018).

The development of teaching modules really needs to be developed because modules are an important component in education, because without modules students will have difficulty in the learning process (Amini & Saniyah, 2021; Khaq, 2022). The modules developed have been adapted to current developments by utilizing the Canva website. Canva is an application or website that can be used to design teaching modules or other learning tools (Irkhamni et al., 2021; Monoarfa & Haling, 2021). The stages of this research start from the first stage, namely analysis. At this stage, material analysis and digital teaching module analysis were carried out. After the analysis, it was discovered that practicum digital teaching modules really needed to be developed in science learning which required practicums in it. The second is the design stage, at this stage the researcher designs the teaching module that will be developed through the stages of determining the material that will be presented in the module, then compiling learning outcomes, compiling practical steps, and compiling assessment instruments. The third is the development stage, at this stage the researcher develops the product that has been designed, then the product that has been developed will be submitted to experts for validation. The teaching modules developed will be revised if there is input from experts for improvement. Fourth, namely the implementation stage, in this research the implementation stage was not carried out because the courses presented in the digital practicum teaching module that were developed were not obtained by students in the even semester when the researcher carried out the research. The fifth is the evaluation stage. The evaluation carried out in this research is a formative evaluation which carries out an evaluation process in each product development process which is developed in the form of digital teaching modules for elementary school science skills development practicum.

This finding is reinforced by previous research findings stating that video as a learning medium can encourage the emergence of creative ideas from students because of the visualization and sound presented through video (Pebriani, 2017). Borg and Gall's (1983) development method states that the interactive digital module media for braille learning is very good to use with validation results from learning material experts (Kurniawan Andri, 2021). STEM-based digital teaching modules to develop problem-solving abilities (Pixyoriza et al., 2022). Digital practicum module based on nature of science (NOS) to improve higher order thinking skills (HOTS) (Dinatha & Kua, 2019). The difference between this development research and previous research is that it is seen in terms of the material developed, the research location, and the appearance of the digital teaching modules developed. The digital practicum teaching module developed in this research contains descriptions of material from elementary school science skills development courses, especially on the topic of the properties of light, there is a practicum video which presents the practicum steps starting from the preparation of tools and materials until the practicum is completed, and there are a worksheet that must be done by students which invites students to carry out practicums using simple tools and materials but the work method is different from the practicums presented in the video.

The novelty in the module created in this research is that first, this teaching module was designed based on technological advances by developing digital teaching tools, second, this teaching module was designed based on problems that often occur in higher education, third, the teaching module is only limited to elementary science skills development courses. on the topic of the properties of light, and fourthly, this research uses the ADDIE model, but only focuses on the analysis, design, development and formative evaluation stages. The implication of this research is that students can more easily carry out practicums and are able to learn independently about the properties of light with the teaching module which is presented in the form of a link that can be accessed anywhere and at any time, so that students can save their time in the learning process. Apart from that, lecturers can be helped in the learning process by having digital

practicum teaching modules which are presented online, so that teaching modules do not need to be printed which requires paper and ink, thereby saving costs. This practical digital teaching module can be accessed using adequate electronic devices such as cellphones, laptops and computers.

4. CONCLUSION

The resulting product is a digital teaching module for elementary school science skills development practicum. The teaching module developed was created using the Canva application. The development of this teaching module uses the ADDIE development model to produce a valid and practical teaching module so that it can be applied in the learning process. It is recommended that students be able to use digital teaching modules for elementary science skills development practicums well in the learning process and can carry out practicums well according to the steps. Lecturers are expected to be able to utilize digital teaching modules for elementary science skills development practicum when implementing elementary science skills development courses. It is hoped that other research will be able to continue the development of practicum digital modules at an effectiveness level, because in this research it only reaches the design, validity and practicality and can use this research as a guide in developing similar media.

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