SCHOOLAR: Social and Literature Study in Education
Vol. 2 No. 3 December 2022, Page. 143 - 147
E-ISSN: 2797-0299

Validity and Development of Anyflip Application-Based Electronic Module in View of Student Learning Outcomes

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ABSTRACT
This study aims to make mathematics learning media in the form of electronic modules using the Anyflip application which is of good quality and appropriate for use in learning mathematics. The anyflip application is a software developer for creating electronic modules. The quality criteria used as a reference in this study are Nieveen's criteria, namely validity, practicality, and effectiveness. The design of this research is research development (Research Development). In carrying out this research, the stages of developing mathematics learning media in the form of electronic modules using the Anyflip application use a development model adapted from the Borg and Gall development model. The development stages carried out were (1) Preliminary study, (2) Planning, (3) Draft development, (4) Limited field trial, (5) Product revision, (6) Small group trial, (7) Test field trials, and (8) Distribution and use. Product validity was obtained from the validation of material experts and learning device experts to assess the products being developed. The research instruments used were material expert validation sheets and learning device expert validation sheets. This research produces an electronic module for learning mathematics using the Anyflip application that is of good quality and feasible. The results of this study indicate that the developed electronic module for learning mathematics is valid based on the results of assessments from material experts and learning device experts.

***Keywords**: Electronic_Modules; Anyflip; Development;Learning_Mathematics.*

INTRODUCTION
Based on Law No. 20 of 2013 concerning the national education system states that "National education functions to develop capabilities and shape dignified national character and civilization in order to educate the nation's life, aims to develop the potential of students to become human beings who believe and fear God Almighty, have noble character, healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens". This shows that national education encourages the creation of the next generation who have religious character, have noble character, are independent, democratic and responsible. Education is one of the government's efforts to improve the character of the younger generation in particular and this nation in general (Sudarmaji & Khuzaini, 2017). (Nudin, 2020) stated that the crisis of morality and the main character of this nation has become so acute. The best solution to improve the nation's character is to optimize education (Giwangsa, 2018). One of the low student learning outcomes is influenced by the less optimal use of alternative learning media in the learning implementation process, so that students feel bored in learning (Tasya Nabillah & Abadi, 2019). To avoid this, teachers can take advantage of learning technology to help the process of conducting conducive learning activities.

Technological developments in the world of education have a positive impact on teachers and students as well as other educational devices. The use of technology in learning has been implemented in the school curriculum as an innovation to create innovative and fun learning (Idhayani dkk., 2020). Technology, especially learning media, is an important component in the learning process. The electronic module is an example of using learning technology that can be applied by teachers to help students obtain information about learning materials that can be accessed anytime and anywhere. (Herawati & Muhtadi, 2018). Along with the development of increasingly sophisticated technology, innovation is used in every

implementation of the learning process, including the use of sound, images and animation in educational modules or often commonly called interactive e-modules (Haeriyah & Pujiastuti, 2022). Teachers can find out students' thinking processes, one of which is by giving test questions (Umardiyah & Nasrulloh, 2021).

Based on the results of interviews with mathematics teachers at Assalafiyah Vocational School Mlangi-Sleman on July 14 2022, information was obtained that the school used the 2013 curriculum by implementing character education for each learning and student-centered learning, but the learning carried out was still limited to using books as media learning. As a result, students become less interested in learning mathematics and result in low student learning outcomes. Other information from the pre-research questionnaire on class X students of Assalafiyah Vocational School Mlangi-Sleman is that students want an electronic module in which there are images that can be opened via a smartphone and can be opened anywhere. Assalafiyah Vocational School Mlangi-Sleman has 2 computer laboratory rooms that are used for ICT learning. The number of computers owned is 31. All computers are in good condition and can be operated. At Assalafiyah Vocational School Mlangi-Sleman, students have received ICT lessons since class VII, so students are familiar with using computers in learning.

From the description above, namely the importance of media in the form of electronic modules as an alternative learning device that students can use and it is common for students to use computers and smartphones, so to facilitate this, it is necessary to develop electronic modules for students. Furthermore, validation will be carried out for products developed by material experts and learning device experts to assess the validity of these products.

METHOD

This research is development research. This research is a research and development of educational learning media (educational research and development) with the aim of producing mathematics learning media in the form of electronic modules using the Anyflip application which is of good quality and appropriate for use in learning mathematics. This study uses a development model adapted from the development model proposed by Borg and Gall(Khuzaini dkk., 2022). The research and development stages developed by Borg and Gall are: (1) Preliminary study, (2) Planning, (3) Draft development, (4) Limited field trials, (5) Product revision, (6) Trial trials small groups, (7) Field trials, and (8) Dissemination and use.

Product validity refers to Nieveen (Khuzaini & Santosa, 2016) namely the quality of the product being developed must meet valid, practical, and effective criteria. In this study devoted to the validity criteria. Nieveen (Khuzaini & Santosa, 2016) stated "The components of the intervention should be based on state-of-the-art knowledge (content validity) and all components should be consistently linked to each other (construct validity)". This can be understood, namely the validity of a product can be seen in its interrelationships, and considering the objectives of developing the product. Nuryadi dan Khuzaini (2017: 62) states that, a product can be said to meet the validity criteria if the assessments of experts, both material experts and media experts or learning devices are included in the minimal category of "good". The instrument used for this study was an assessment/validation sheet from a software evaluation checklist developed by Kristin Miller (Pertiwi & Khuzaini, 2022). For the assessment of material experts there are 10 items and the assessment of learning device experts is 14 items.

The validity data analysis technique is carried out as follows. To find out the level of validity quality of the electronic module developed based on the material content, the categories on the Likert scale are interpreted as: very good (5), good (4), enough (3), less (2), very less (1) converted into data intervals as reference. The resulting electronic module for learning mathematics is said to be valid if each of the criteria achieved is good.

Table 1. Validity Interval Criteria

Interval Scor	Criteria
$\bar{X}_i + 1.8\ sb_i < \bar{X}$	Very Good
$\bar{X}_i + 0.6\ sb_i < \bar{X} \leq \bar{X}_i + 1.8\ sb_i$	Good
$\bar{X}_i - 0.6\ sb_i < \bar{X} \leq \bar{X}_i + 0.6\ sb_i$	Enough
$\bar{X}_i - 1.8\ sb_i < \bar{X} \leq \bar{X}_i - 0.6\ sb_i$	Less
$\bar{X} \leq \bar{X}_i - 1.8\ sb_i$	Very Less

RESULT AND DISCUSSION

Result

Preliminary studies

The first step in the development of this electronic module is a preliminary study. At this stage the researcher collects information related to the problems faced by teachers at school. Researchers collected information in several ways, namely interviews, observing students' needs, and observing the state of the school. The problems encountered included the lack of flexibility in the printed books brought by students, the time needed by students to access learning resources in the form of learning modules was limited because thick printed books could not be carried anywhere.

Planning

At this planning stage, the researcher determines the mathematics material to be studied with the electronic modules to be developed, core competencies (KI), basic competencies (KD), indicators, and character education values to be included in the learning modules to be developed. It is obtained that the learning material that will be used is Pythagorean material and the character values included in this learning media are love of the motherland, religion, and independence.

The next stage is to make storyboards and flowcharts from the mathematics learning electronic module that will be developed, the purpose of making this storyboard is so that when making it it doesn't go astray according to the initial plan. Flowchart or display diagram is a description of the workflow of this learning media. The researcher also compiled validation sheets to validate the developed electronic modules, namely validation sheets for material experts and validation sheets for learning device experts.

Developing Draft

This stage is the stage of compiling electronic modules for learning mathematics based on storyboards and flowcharts that have been prepared before. Making displays and images in the developed electronic module uses the Anyflip application. In addition, at this stage a Learning Implementation Plan (RPP) was also prepared which was used in the research. The preparation of this lesson plan is based on Basic Competency (KD) and indicators of learning mathematics from the Pythagorean material so that the developed electronic module can be said to be good. Making the electronic module assessment validation sheet that was developed produced a validation sheet for material experts with a total of 10 statement items and a learning device expert validation sheet with a total of 14 items.

Material expert assessment was carried out by one appraiser with many material expert assessment items, namely 10 items. Thus it can be obtained an ideal minimum score = 10, ideal maximum score = 50, $\overline{x_i} = 30$ and $SB_i = 6{,}6$. While the assessment of learning device experts to assess the electronic modules developed was carried out by one assessor with many assessment items, namely 14 items. Thus it can be obtained a minimum ideal score = 14, an ideal maximum score = 70, $\overline{x_i} = 42$ and $SB_i = 9{,}33$. So that the interval criteria is obtained as follows:

Table 2. Results of Validity Interval Criteria

Interval		Value	Category
Material Expert	Media Expert		
$X > 42{,}01$	$X > 58{,}79$	A	Very Good
$34.00 < X \leq 42.01$	$47{,}60 < X \leq 58{,}79$	B	Good
$26{,}00 < X \leq 34.01$	$36{,}40 < X \leq 47{,}60$	C	Enough
$18{,}00 < X \leq 26{,}00$	$25{,}21 < X \leq 36{,}40$	D	Less
$X \leq 18{,}00$	$X \leq 25{,}21$	E	Very Less

Discussion

Validation of Material Experts and Learning Device Experts

The validation of material experts and learning device experts is intended to assess the electronic modules that are developed to obtain an assessment of the validity criteria. This assessment was carried out by material experts and learning device experts. The validation results from the material experts obtained a total score of 39. If you look at the conversion table of the material expert's assessment of value $34.00 < X \leq 42.01$. From the results of the value conversion it can be said that the results of the validation of material experts on the electronic modules developed are in the Good category. While the validation results by learning device experts on the entire electronic module developed, obtained a total

score of 57. If you look at the conversion table of value learning device expert assessment $47{,}60 < X \leq 58{,}79$. From the results of the value conversion, it can be said that the results of the expert validation of learning devices on the electronic modules developed are in the Good category.

So it can be concluded that the product being developed can be said to have fulfilled the Valid criteria. Product Revision After the electronic modules developed were evaluated by material experts and learning device experts, some input or suggestions were obtained from learning device experts regarding the electronic modules being developed. The following are suggestions for improving the appearance of the electronic module from material experts: (1) Pay attention to the use of English, (2) Page numbers need to be clarified, (3) "Continue" and "Back" navigation is less visible.

One of these electronic learning resources is electronic modules. The e-module that will be produced consists of several components, namely material, images, and other interesting things. This e-module can also be used as a source of independent learning for students (Santika & Sylvia, 2021). The e-module that will be used is anyflip-based e-module that is used via a smartphone or laptop. The use of this e-module is not limited by place and time, depending on the facilities and infrastructure owned by students in accessing the e-module. The development of learning resources for students needs to be carried out by the teacher as a form of teacher effort in innovation in learning and increasing student competence. Interesting learning resources can be used as learning tools that can help students to make it easier to understand the material and remember the material.

The e-module also presents a summary of the material, and there are also practice questions or evaluations to test students' understanding of the material. E-modules can be used as tools to complement teaching materials used by teachers in the learning process and e-modules can assist teachers in explaining subject matter. E-module here has an important role in the learning process. The learning process can take place effectively when using electronic modules because it can help students who experience learning difficulties. E-modules can help students learn independently both at school and at home and can measure their level of understanding because this e-module is equipped with concept maps, materials and evaluations. The difference between the E-module that is developed with the usual modules that are usually given to students in the form of sheets of paper, E-modules are designed using an electronic format so that they can be accessed with various devices such as computers, laptops and smartphones.

This e-module is also not only in the form of written material, but also contains a learning video in the form of a YouTube link which can be accessed on the content of the material. In addition, there are quizzes in the form of educational games, which can train students to understand the material and increase their enthusiasm in the learning process. This module is also designed based on curriculum standards applied in schools so that the teaching materials produced are relevant to core competencies, basic competencies and competency achievement indicators. Based on the explanation above, the results obtained from the research were that the researchers succeeded in developing a learning media, namely an interactive e-module based on the anyflip application which states that information is valid and effective for use in online learning.

CONCLUSION

Based on the results and discussion, it can be concluded that the results of this study are as follows. The development of electronic modules for learning mathematics was developed by adapting the Borg and Gall development model, with the development stages: (1) preliminary study, (2) planning, (3) draft development, (4) limited trials, (5) product revisions (6) small group trials, (7) large group trials, and (8) deployment. In this study, because it was only looking for the validity of a product being developed, the stages only reached stage 4, namely limited trials using material expert validation and learning device expert validation. Furthermore, the results of the developed electronic module are declared valid. This was concluded from the results of the validation assessment of material experts and learning device experts, each of whose assessment conversions was in the "Good" category.

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