

Validation of Define Stages in the Development Process of STEM-Based E-Modules with Plant Themes in Children Aged 5-6 Years

*Cupfianis, Abna Hidayati

Master Program of Education Technology, Postgraduate School - Universitas Negeri Padang
*E-mail: cupfianis@gmail.com

Received: 10 Jan. 2022, Revised: 15 Jun. 2022, Accepted: 20 Jun. 2022

ABSTRACT

The background of this research is because the world of education is currently growing, and various kinds of reforms are being carried out to improve the quality and quantity of education. To improve the quality of education, various breakthroughs are needed in curriculum development, learning innovation, and educational infrastructure. Through the Development of (Science, Technology, Engineering, And Mathematics) STEMBased E-Modules, the theme of plants is very attractively designed and packaged in learning multimedia so that it can be taken anywhere and can be accessed anywhere. The E-Modules can be taken anywhere and anywhere. One suitable device is Android. This research uses Research and development (R&D) with a development model (4-D) which consists of 4 stages, namely, Define, Design, Develop and Disseminate. This development model was chosen because this model has a systematic procedure, which is used to develop learning tools, especially learning media in the form of E-Modules. Based on the results of the feasibility validation test from the material, language, and media aspects using a validated questionnaire. The results showed that the plant-themed STEM-based e-modules were very valid with an average score of 89.33% with a content feasibility test percentage of 96%, language feasibility of 92%, and the feasibility of media construction is 80%. So it can be concluded that the process validation of the different stages in the STEM-based E-Module with the theme of Plants with valid criteria.

Keywords: STEM-based E-module, Plant Theme, Learning Outcomes.



This work is licensed under the Creative Commons Attribution-ShareAlike 4.0 International License

INTRODUCTION

The world of education is currently growing, and various kinds of reforms are being made to improve the quality and quantity of education (Darling-Hammond, 2015). To improve the quality of education, various breakthroughs are needed in curriculum development, learning innovation, and educational infrastructure (Yanto, 2022). To improve the learning process, teachers are required to make learning more innovative which encourages students to learn optimally both in independent learning and in classroom learning. Education has a very important role in improving the quality of human resources (Tanjung, 2020). For humans, education functions as a means and facility that facilitates being able to direct, develop and guide towards a better life, not only for oneself but also for other humans from an early age.

Learning media are channels or intermediaries used to convey messages or teaching materials (Ramdhani & Muhammadiyah, 2015). Media is indispensable in learning as a means of conveying information and messages from teachers to students. Good and smooth learning requires learning media that are good and appropriate to class conditions (Tamrin et al., 2017). Learning the theme of plants requires media with elements of motion

(Septiana et al., 2022). Therefore, the learning e-module is one of the appropriate media for displaying plant themes; types of plants, and uses of plants To attract the attention and interest of students, e-modules are made as attractive as possible to support the learning process of children, especially children aged 5-6 years. This is also reinforced based on the author's observations in the field, in general, the implementation of learning in Early Childhood Education still tends to be conventional. The teacher explains the lesson using printed books which are distributed to each child. Then the teacher explains the material and then the children listen, after that the children are told to bold and color the pictures in class.

Seeing this situation is less effective and causes boredom in children in the process of teaching and learning activities because some children do not focus on the plant material provided. Many children are still playing and wrestling with their friends while the teacher is explaining the lesson. and sharpen critical thinking skills. Based on observations in several Kindergartens, there are still very few schools that apply STEM-based learning and educators do not know about STEM-based learning. So that there is no specific assessment regarding STEM-based learning.

Fitriyani (2020) This research is entitled "Development of Android-Based STEM E-Modules in Quadrilateral Material in Class VII SMPN 18 Jambi City". The results of the research: 1) the research produced an Android-assisted STEM-based E-Module on quadrilateral material for students of class VII junior high school; 2) the results of the material expert's assessment are 80% with a fairly valid validity level and the media expert's assessment is 80% with a fairly valid validity level; 3) obtaining a practicality assessment by the teacher of 85.5% with a very practical practicality level and a practicality assessment by students of 84.4% with a very practical practicality level; 4) the effectiveness criteria based on the learning outcomes test 26 students reached ≥ 75 so that the percentage of completeness reached 83.87% while the results of the student response questionnaire were 86.98% with very effective criteria and the average acquisition of observations in each meeting was 83.88%. The developed learning module is suitable for use as a learning resource for students.

Furthermore, research conducted by Adinda et al (2021). This research is entitled "Development of Reflection and Refraction E-Modules in Stem-Based Curved Fields for Prospective Physics Teacher students." The validity of this electronic module by experts from three aspects, namely aspects of content, design, and language, obtained an average result of 4.9 with very valid criteria. As for the practicality of this electronic module, it was obtained through a questionnaire at the one-to-one evaluation stage and small group evaluations obtained an average result of 88.2% and 91.8% with very practical criteria.

In addition, Rizaldi et al (2020) conducted research entitled "Development of E-Module for STEM-Based Optical Tools for Prospective Physics Teacher Students". the following results are obtained, the content aspect is 91.4% in the very valid category, the linguistic aspect is in the very valid category 97.1%, and the design aspect is 94.2% in the very valid category. To assess the practicality obtained from the one-to-one evaluation stage with a score of 93.75% in the very practical category and the results of the small group evaluation stage of 88.89% in the very practical category, it can be concluded that the electronic

module for STEM-based optical devices is very practical.

Based on the relevant research, there are differences and similarities with the research that the researchers will conduct, the similarities in this study are that they both use and develop STEM-based E-modules, while the differences are the place of implementation as well as the subject matter and object material applied in the E-Module. Regarding the problems above, Early Childhood Education Schools (PAUD) need learning innovations to make it fun for children, here the researcher proposes a study entitled "The Process of Developing STEM-Based E-Modules with Plant Themes in Children Aged 5-6 Years".

METHODS

This type of research in the design and manufacture of E-Modules as learning media in STEM-based learning with the theme of plants is a research and development approach that is better known as Research and Development (R&D). According to Richey & Klein (2010), research and development is a systematic way used to design, and develop learning programs and products that can meet internal criteria. Through this research and development, researchers can develop a Plant-themed STEM-based e-module product for children aged 5-6 years so that the learning process is by the objectives.

RESULTS

This research was conducted based on the development stages (4-D) which consisted of 4 stages, namely, Define, Design, Develop and Disseminate. After these stages are carried out, results are obtained concerning the validity of the development of STEM-based E-Modules. This study uses a 4-D model which consists of 4 stages of development, namely Define, Design, Develop, and Disseminate. These stages will be explained in the results of research conducted using the development stage carried out, namely the Define stage, which is one of the ongoing research processes.

The define stage aims to raise and define the basic problems encountered in learning the theme of plants, the sub-themes of which are ornamental plants, fruit plants, and vegetable plants. The defined stage is related to competency standards, basic competencies, and indicators that students want to achieve.

3.1 Media validation

Media validation is an assessment of media validity in STEM-based E-Modules. There are 13 statements for media validation indicators in STEM-based E-Modules. The percentage of STEM-based E-Module validation results can be seen in Table 1 below.

Table 1. Media validation results

Assessment Aspects	Items	Total score	Maximum Score	Validity Value	Category
E-Module size	1	4	5	80 %	Valid
	2	4	5	80 %	Valid

Assessment Aspects	Items	Total score	Maximum Score	Validity Value	Category
Cover Design	3	3	5	60%	Pretty valid
	4	4	5	80%	Valid
	5	3	5	60%	Pretty valid
	6	3	5	60%	Pretty valid
Content Design E-Module	7	5	5	100%	Very Valid
	8	5	5	100%	Very Valid
	9	4	5	80%	Valid
	10	5	5	100%	Very Valid
	11	4	5	80%	Valid
	12	4	5	80%	Valid
	13	4	5	80%	Valid
Total		52	65	80%	Valid

In table 1 below the assessment for media validation indicators in STEM-based E-Modules shows that the average percentage obtained is 80% with a very valid category.

3.2 Language validation

Assessment for language validation in STEM-based E-Modules. There are 10 statements for language validation indicators in the STEM-based E-Module. The percentage of language validation results in STEM-based E-Modules can be seen in Table 2 below.

Table 2. Language validation results

Assessment Aspects	Items	Total score	Maximum Score	Validity Value	Category
The language used in the e-module is in accordance with the aspects of writing EBI in Indonesian language rules	1	4	5	80 %	Valid
Sentence instructions for using the e-module can be understood easily	2	5	5	100%	Very Valid
The material language in the e-module is readable and easy to understand clearly	3	5	5	100%	Very Valid
Appropriateness of the use of language in general	4	5	5	100%	Very Valid
Sentences of learning instructions are made communicative	5	5	5	100%	Very Valid
The materials/sentences used in the e-module are unambiguous	6	5	5	100%	Very Valid
The use of language according to the character of students aged 5-6 years	7	4	5	80 %	Valid
The terms used are in accordance with KBBI	8	5	5	100%	Very Valid
Sentences and language according to the picture	9	5	5	100%	Very Valid
Sentences and language according to the video	10	5	5	100%	Very Valid
Total		48	50	96%	VeryValid

In table 2 of the validator's assessment of language validation indicators in STEM-based E-Modules shows that the average percentage obtained is 96% with a very valid category.

3.3 Content/material validity

Assessment for content validation of STEM-based E-Modules. Content validation indicators based on the validation instrument contained 18 statements. The percentage of STEM-based E-Module content validation results can be seen in Table 3 below.

Table 3. Content/material validation results

Assessment Aspects	Items	Total score	Maximum Score	Validity Value	Category
Learning objectives	1	2	5	40 %	Less Valid
	2	2	5	40 %	Less Valid
Learning materials	1	5	5	100%	Very Valid
	2	5	5	100%	Very Valid
	3	5	5	100%	Very Valid
	4	5	5	100%	Very Valid
	5	5	5	100%	Very Valid
	6	5	5	100%	Very Valid
	7	5	5	100%	Very Valid
	8	5	5	100%	Very Valid
Learning methods	1	5	5	100%	Very Valid
	2	5	5	100%	Very Valid
Learning Resources	1	5	5	100%	Very Valid
	2	5	5	100%	Very Valid
Learning Activities	1	4	5	80%	Very Valid
	2	5	5	100%	Very Valid
	3	5	5	100%	Very Valid
	4	5	5	100%	Very Valid
Total		83	90	92%	Very Valid

From Table 3, it is obtained that the average of all statements on the content validity assessment indicator is 92% with very valid criteria. Based on a questionnaire assessing the validity of the plant-themed STEM-based E-Module for children aged 5-6 years with 3 assessment variables, namely content/material validity, media validation, and language validation. The three variables are described in several statements. To get the final value of the STEM-based E-Module validation, is determined from the average value of the three validation variables in Table 4, namely.

Table 4. Average e-module validity value

No	Indicator	Validity Value (%)	Criteria
1	Media Validation	80%	Very Valid
2	Content Validation	96%	Very Valid
3	Language Validation	92%	Very Valid
	Total	89,33 %	Very Valid

Based on Table 4 above, it is known that the results are generally said to be very valid because they have an average validator value of 89.33%.

CONCLUSIONS

Based on the results of the planning stage in carrying out the process of developing the original design of the product to be produced, plant-themed STEM-based E-modules for

children aged 5-6 years were developed. For the first product to be suitable for use in subsequent fields, the feasibility of its components must be considered. Actions taken include selecting an E-Module image, selecting a display format, and compiling the E-Module framework. This can be concluded from the results of media validation, the results are 80%, material validity is 96%, language validity is 92%, and the average validity value is 89.33% with a very valid category. Therefore, it can be said that the STEM-based E-Module with the topic of plants has gone through a valid validation process at the planning stage.

REFERENCES

- Adinda, R. S. T., Sudirman, S., & Saporini, S. (2021). Pengembangan E-Modul Pemantulan Dan Pembiasan Pada Bidang Lengkung Berbasis Stem Untuk Mahasiswa Calon Guru Fisika (Doctoral Dissertation, Sriwijaya University).
- Darling-Hammond, L. (2015). *The Flat World And Education: How America's Commitment To Equity Will Determine Our Future*. Teachers College Press.
- Fitriyani, Z. (2020). Pengembangan E-Modul Berbasis Stem (Science, Technology, Engineering, And Mathematics) Berbantuan Android Pada Materi Segiempat (Doctoral Dissertation, Fkip).
- Ramdhani, M. A., & Muhammadiyah, H. (2015). *The Criteria Of Learning Media Selection For Character Education In Higher Education*.
- Richey, R. C., Klein, J. D., & Tracey, M. W. (2010). *Conditions-Based Theory*. In *The Instructional Design Knowledge Base* (Pp. 124-148). Routledge.
- Rizaldi, W. R., Sudirman, S., & Saporini, S. (2020). Pengembangan E-Modul Alat-Alat Optik Berbasis Stem Untuk Mahasiswa Calon Guru Fisika (Doctoral Dissertation, Sriwijaya University).
- Septiana, I. G. Y., Wibawa, I. M. C., & Trisna, G. A. P. S. (2022). Interactive Multimedia Based On Articulate Storylines In The Topic Of Plant Anatomy And Physiology. *International Journal of Elementary Education*, 6(2).
- Tanjung, B. N. (2020). Human Resources (Hr) In Education Management. *Budapest International Research And Critics In Linguistics And Education (Birle) Journal*, 3(2), 1240-1249.
- Tamrin, M., Azkiya, H., & Sari, S. G. (2017). Problems Faced By The Teacher In Maximizing The Use Of Learning Media In Padang. *Al-Ta Lim Journal*, 24(1), 60-66.
- Yanto, R. (2022). Using Learning Videos On Google Classroom To Increase Learning Outcomes Of Computer System Subjects In Vocational High School. *Jurnal Vokasi Informatika*, 143-148.