Development of e-modules based on local wisdom to improve Junior High School student learning outcomes in science learning

Sri Astika Adeningsih[1*], Nova Elysia Ntobuo[2], Masri Kudrat Umar[2], Mursalin[1], Trisnawaty Junus Buhungo[2], Tirtawaty Abdjul[1]

[1]Department of Science Education, Faculty of Mathematics and Science, Gorontalo State University, Bone Bolango, Gorontalo, Indonesia
[2]Department of Physics, Faculty of Mathematics and Science, Gorontalo State University, Bone Bolango, Gorontalo, Indonesia
*Correspondence: sriastikaadeningsih@gmail.com

Abstract

This research aims to produce a product in the form of a learning E-module, namely an E-module based on local wisdom. Then a validation test was carried out to determine the feasibility and quality of the local wisdom-based e-module. This type of research is development research or Research and Development (R&D) with the ADDIE model which consists of stages, namely analysis, design, development, implementation and evaluation. Data collection techniques are by means of interviews, observations, and questionnaires. The validation test results obtained an average of 3.62 which was interpreted into the valid or appropriate category. Student respondents to the e-module obtained a percentage result of 86.11% in the very good category. As well as achieving a percentage of student activities of 84.5% in the good category. Based on the data that has been obtained, it can be concluded that the local wisdom-based e-module has met the criteria of being valid, practical, effective and therefore suitable for use in science learning at school.

Keywords: development; e-modul; local wisdom.

INTRODUCTION

Education is one of the efforts to realize the achievement of the nation's goals and ideals, namely making the nation's life more intelligent. Education is presented as an effort to change a person's behavior and potential to become better. Education is carried out consciously and systematically to motivate, encourage and help realize one's potential . maximum to achieve better self-quality. In the world of education, improving the quality of learning is very important, especially as teaching in schools greatly influences the teaching and learning process to achieve success, especially in an integrated science learning environment (Aslan, 2017). The learning process can be said to be successful if students can understand the material being taught well. Learning involving students, teachers, learning

environments and learning models to achieve a complete and optimal learning experience for students. Science and technology develop from time to time. This is demonstrated by the use of new technological tools which are enriching for some people, both children, teenagers and adults. by presenting learning material in the form of text, animation, audio and video (Himawan & Mubarok, 2023).

One of these learning tools is the use of E-Modules. E-Modules are electronic teaching materials that can be used for personal or group purposes and can be collaborated with various media, such as images, sound and video. The use of an interesting learning environment, such as E-modules, encourages students to learn by motivating students to learn (Afrila & Yarmayani, 2018).

According to (Ricu Sidiq & Najuah, 2020)that science learning is more effective and easier when it is connected to the surrounding environment. Currently, the surrounding environment must pay attention to preserving local wisdom. Local wisdom-based learning is learning that utilizes local advantages or local wisdom in economic, cultural, food, language, information and communication technology, ecology, etc. aspects, all of which can motivate students to learn.

Apart from that, (Rizawayani, Adelila Sari, & Safitri, 2017) also argue that science learning which is collaborated with local wisdom is more effective and students' understanding is better. The collaboration between these two things has a good impact on improving student learning and students help preserve local culture. Local wisdom really needs to be linked to the study of natural sciences, because many scientific concepts are closely related to daily habits, especially local wisdom in typical Gorontalo food. Local wisdom-based learning is an implementation of the educational unit level curriculum and can be developed in the learning process. Learning assisted by local wisdom is learning that utilizes local advantages or local wisdom in economic, cultural, food, language, information and communication technology, ecology, etc. aspects, all of which can improve students' abilities.

Therefore, science learning should require the use of the internet in learning that is interesting and supports the learning process for students. Because the structure and content of science are abstract concepts, the E-module can make it more concrete or real. Science materials should be simple and practical, with the help of learning media that can make them real, simple, easy and practical (Wahyu, Edu, & Nardi, 2020). E-modules can help make it easier for students to learn and present material packaged with local wisdom to make it more interesting, so that students have enthusiasm and enthusiasm for learning.

Based on this background, this article will discuss the development of local wisdom-based e-modules on junior high school students' learning outcomes in science learning. It is hoped that this research can produce valid, practical and effective products (Yunus, 2014).

METHODS

The method used in this research is development research, which focuses on developing E- modules based on local wisdom. This research refers to the ADDIE development model developed by two experts, namely Reiser and Molenda (Hidayat & Nizar, 2021). The ADDIE model was chosen in this research because it is a product-oriented learning design model. Then the ADDIE model can be used to develop various products (learning tools), such as learning media, teaching materials, learning methods or models, and learning strategies.

The ADDIE model consists of 5 stages, namely Analysis, Design, Development, Implementation and Evaluation. The data collection technique used in the research is measuring the validity, practicality

and effectiveness of E-modules based on local wisdom on additive materials. The data in this research was processed in the form of descriptive analysis data obtained through the results of needs analysis, interviews, criticism (input) and suggestions from device experts, results of student response questionnaires, results of learning implementation, student activities and data analysis on participant learning test results educate.

RESULTS AND DISCUSSION

The results of developing an E-module based on local wisdom were obtained through the steps in developing the ADDIE model which consists of the following 5 stages:

Analysis Stage (Analysis).

At the initial stage in this development research, the researcher carried out an initial analysis, namely collecting information through literature studies, observations or observations of learning activities and student analysis regarding the needs and characteristics of students. In this stage, it was found that students had difficulties when learning face-to-face, students lacked concentration during learning due to the use of less interesting learning media. Next, carry out concept analysis in accordance with basic competencies and indicators in accordance with the curriculum.

Design Stage (Design).

The second stage is product design or planning. In this stage, researchers begin to design media and materials that will be developed into E-modules. Starting from making the design by determining the background concept, to simplify the concept that will be created in the E-module, layout concept, material content and other supporting images.

Development Stage (Development).

In this third stage, the design that has been designed will then be processed and loaded into the E-module. After the product has been developed, the next stage is a validation test carried out by two validators, namely device experts. Testing is carried out using a validation instrument sheet in the form of a questionnaire with a rating scale together with the product that has been developed and given to the validator. The following are the validation results by two validators, presented at Table 1 (Mustami, 2017).

Table 1. Validation Results of Learning E-modules

Validator	Average	Criteria	Information
Validator I Validator II	3,62	Valid	Can be used with minor revisions

Table 1 shows that the average validation value is 3.62 which is in the valid category (3.01 - 3.75), where the assessment from device experts shows that the E-module developed is good and can be used with slight revisions. The results of the validation of learning tools are presented in the Tabel 2.

Table 2. RPP Validation Results

Validator	Average Per Validator	Overall Validator Average	Criteria	Note
1	3,55	3,58	Valid	Can be used with minor revisions
2	3,56		Valid	

Table 2 shows that the average validation value is 3.58 and is in the valid category (3.01-3.75). The assessment results from the two validators show that the RPP developed is good and can be used with minor revisions. The results of the LKPD validation are presented in Table 3.

Table 3. Validation of LKPD

Validator	Average Per Validator	Overall Validator Average	Criteria	Note
1	3,69	3,64	Valid	Can be used with minor revisions
2	3,59		Valid	

Table 3 shows that the average validation value is 3.64 and is in the valid category (3.01-3.75). The assessment results from the two validators showed that the LKPD assisted by the e-module that was developed was good and could be used with a few revisions. The results of the validation of the learning outcomes test are presented in table 4.

Table 4. Validation of Learning Outcome Tests

Validator	Average Per Validator	Overall Validator Average	Criteria	Note
1	3,69	3,62	Valid	Can be used with minor revisions
2	3,54		Valid	

Table 4 shows that the average validation value is 3.62 and is in the valid category (3.01-3.75). The assessment results from the two va (Placeholder1)lidators show that the learning outcomes developed are good and can be used with minor revisions. And it is declared valid after going through the validation and revision stages by the validator so that it is feasible and can be applied in learning. The results of this validation and revision stage will then be tested.

Implementation Stage (Implementation).

At this stage, product trials are carried out on students to see the practicality and effectiveness of the local wisdom-based E-module. The practicality of learning tools can be obtained from the results of data analysis of learning implementation and student responses. Based on the trials that have been carried out, the researchers obtained the following data. The implementation of this learning is to determine the practicality of a student worksheet that is developed (Azizahwati & Mohd Yasin, 2017). The results of the analysis of learning implementation showed that the average percentage of learning implementation in 2 meetings can be seen in Table 5.

Table 5. Percentage of Implementation of Limited Test Learning

Meeting	Persentase (%)	Criteria
1	83	SB
2	89	B
Average	86,11	SB

Based on table 5, it can be seen that the average percentage achievement of learning implementation during 2 meetings at SMPN 1 Kabila Bone is 86.11%, including in the "very good" category, this can be seen from the results of the average percentage score obtained, namely 86.11%. The results of this analysis show that the learning process in the limited trials was carried out very well.

The results of the questionnaire analysis of student responses to learning media were obtained through student response questionnaire sheets. This student response questionnaire consists of positive statements and negative statements, in which there are 4 indicators containing 20 statements. The responses given by students to the local wisdom-based e-module are submitted as a reference to assess the level of students' interest in its application in the learning process. Scoring for each statement uses a Likert scale and results from student response data to learning media. Based on the results of the analysis of student response questionnaire data in limited trials, percentage results were obtained which will be described in Table 6.

Table 6. Percentage of Questionnaire Responses from Class A limited trial students

Indicator	Persentase (%)
Happiness	85,3
Attention	86,1
Interest	88,5
Involvement	88,3
Average	**87,0**

Table 6 shows that the average percentage value of the student response questionnaire to the learning e-module is 87.0%, where in the first indicator the average student score is (85.3%), in the second indicator the student score is (86.1%), in the third indicator the student score (88.5%) and in the fourth indicator the student score (88.3%). From the results of the student response questionnaire in this limited trial, it can be concluded that the student response to the learning e-module is in the "Good" category. This means that the use of the Discovery learning model assisted by e-modules in class A in the learning process makes it easier for students to understand the material.

Table 7. Percentage of Questionnaire Responses from Class B limited trial students

Indicator	Persentase (%)
Happiness	86,6
Attention	84,9
Interest	83,8
Involvement	84,6
Average	**85,0**

Table 7 shows that the average percentage value of student response questionnaires to learning media is 85.0%, where in the first indicator the average student score is (86.6%), in the second

indicator the student score is (84, 9%), in the third indicator the student score (83.8%) and in the fourth indicator the student score (84.6%). From the results of the student response questionnaire in this limited trial, it can be concluded that the student response to learning media is in the "Good" category. This means that the use of the Discovery learning model assisted by e-modules in class B in the learning process makes it easier for students to understand the material.

Based on the table shown. shows that students respond well to the local wisdom-based e-module that has been developed. This shows that the e-module received a positive response from students, which means that the e-module is based on local wisdom and is practical for use in the learning process.(Susanti, 2015)

The results of the effectiveness of the Local Wisdom-Based E-module can be seen from the results of student activity data obtained through student activity observation sheets and the results of analysis of student learning tests using individual pretest and posttest learning outcome assessment (THB) sheets (Muhammad Wahyu Setiyadi, Ismail, 2017). Student activity data was obtained through student activity observation sheets. The assessment of students' activities is carried out by observers during 2 meetings by filling in the activities carried out by students on the observation sheet by looking at the students' serial numbers during the learning activities (Jayanti et al., 2022). Based on the results of observations in limited trials, the percentage of student activity obtained is shown in Table 8.

Table 8. Percentage of Activities of Class A Limited Trial Students

Meeting	Activity Percentage Learners (%)	Criteria
1	86	Very good
2	83	Good
Average	84	Good

Based on table 8, it can be seen that the average percentage of student activity in class A was 86%, this result is in the "Good" criteria. Based on these criteria, it can be concluded that the E-module developed is effective for use in the learning process.

Table 9. Percentage of Activities of Class B Limited Trial Students

Meeting	Activity Percentage Learners (%)	Criteria
1	84	Very good
2	82	Good
Average	83	Good

Based on table 9, it can be seen that the average percentage of student activity in class B was 86%, this result is in the "Good" criteria. Based on these criteria, it can be concluded that the E-module developed is effective for use in the learning process.

Analysis of student learning outcomes test data using individual pretest and posttest learning outcomes assessment sheets (THB). The test is structured based on question indicators that are adjusted to learning indicators. The test levels given consist of cognitive levels C1-C5. On limited trials. The Learning Results Test (THB) was given to 23 class VIII A students and 22 class VIII B students during 2 meetings. The following is the average N-Gain score against the pretest and posttest scores in limited trials. The following is the average N-Gain score for the pretest and posttest scores in limited

trials in class A and class B, shown in Table 10.

Table 10. N-Gain Learning Results in Limited Trials in Class A

Pretest (%)	Posttest (%)	N-Gain	Category
50,30	85,22	0,68	Currently

Based on Table 10. Limited trials in Class A show that the score for the Pretest obtained an average score of (50.30%), while the score for the Posttest had an average score of (85.22%). In the limited trial, the N-Gain value obtained was 0.68, which was included in the "Medium" category.

Table 11. N-Gain Learning Results in Limited Trials in Class B

Pretest (%)	Posttest (%)	N-Gain	Category
42,30	82,68	0,69	Currently

Based on Table 11. Limited trials in Class B show that the score for the Pretest obtained an average score of (42.30%), while the score for the Posttest had an average score of (82.68%). In the limited trial, the N-Gain value obtained was 0.69, which was included in the "Medium" category. So it can be concluded that learning using the Local Wisdom Based E-module developed can be said to be effective to use. This shows that students' learning outcomes regarding learning using the E-module developed are effective for use and have an influence on learning outcomes in the students' knowledge aspect.

Evaluation Stage (Evaluation).

This is the final stage of research into the development of the ADDIE model. At this stage final improvements are made to perfect deficiencies in order to avoid obstacles in the future when this Local Wisdom Based E-module will be used in the teaching and learning process.

This local wisdom-based e-module provides benefits for students and teachers alike. In line with research by (Gusrianto & Rahmi, 2022), the use of e-modules can help make the learning process more interesting. This is because using e-modules can help students understand the content of the teaching material. Students can also repeat and re-study the content of the material independently, because e-modules can be studied independently at home. Modules have the advantage that they can be taken anywhere easily, there is no need for paper and ink in direct learning so they are cheaper and easier to implement, e-modules are one of the teaching materials that are effective, efficient and prioritize student independence, (Fathu, 2018). The advantages of this E-module include: it can be accessed and can be used for free, easy to use and operate, can be opened on various devices easily, the E-module address (link) is easy to share, so it can make students enthusiasm in working on evaluation questions, student independence.

However, it cannot be denied that researchers also found weaknesses in using e-modules, namely, e-modules cannot be used if students do not have smartphones and a stable network.

CONCLUSION

The conclusion in this research is that the E-module based on local wisdom on addictive substances has met the quality (Valid, Practical and Effective) as follows: 1). The validity of the e-module based on local wisdom, the learning tools and tests developed are declared valid for use in schools, and obtain conformity by going through validation and revision stages so that they are feasible

and can be applied in learning; 2). The practicality of e-modules based on local wisdom in terms of learning implementation and student responses. The results of the implementation of trial learning were limited to Class A at 86% with "Very Good" criteria, while in Class B it was 83% with "Very Good" criteria. The results of the student questionnaire obtained a positive response, and it can be said to be practical; 3). The effectiveness of local wisdom-based e-modules as reviewed from student activity observation sheets and learning outcomes tests (THB). The results of the student activity sheet in the limited trial were 85% with the criteria "Good" and the learning outcomes test (THB) obtained an N-Gain of 0.68 with the "Medium" category, while in Class B the student activity sheet in the limited trial was 82% with "Good" criteria and the learning outcomes test (THB) obtained an N-Gain of 0.69 in the "Medium" category. And it can be concluded that the development of the Local Wisdom-based E-module that has been developed meets the criteria for effectiveness.

Acknowledgments

REFERENCES

Afrila, D., & Yarmayani, A. (2018). Pengembangan Media Pembelajaran Modul Interaktif Dengan Software Adobe Flash pada Mata Kuliah Matematika Ekonomi di Universitas Batanghari Jambi. *Jurnal Ilmiah Universitas Batanghari Jambi*, *18*(3), 539. https://doi.org/10.33087/jiubj.v18i3.521

Aslan, A. (2017). Nilai-Nilai Kearifan Lokal Dalam Budaya Pantang Larang Suku Melayu Sambas. *Jurnal Ilmu Ushuluddin*, *16*(1), 11. https://doi.org/10.18592/jiiu.v16i1.1438

Azizahwati, A., & Mohd Yasin, R. (2017). Pengembangan Lembar Kerja Siswa Berbasis Kearifan Lokal. *Jurnal Geliga Sains: Jurnal Pendidikan Fisika*, *5*(1), 65. https://doi.org/10.31258/jgs.5.1.65-69

Fathu, F. (2018). Pengembangan E-Modul Pengayaan Keanekaragaman Jenis Tanaman Pangan Umbi Berbasis Kearifan Lokal di Kabupaten Gunungkidul untuk Meningkatkan Kemandirian dan Hasil Belajar Kognitif Siswa Kelas X SMA. *Jurnal Pendidikan Biologi*, *7*, 168–178.

Gusrianto, R., & Rahmi, U. (2022). Pengembangan E-Modul Pada Mata Pelajaran Informatika Berbasis Kurikulum Merdeka Belajar Untuk Kelas VII SMP. *Jurnal Bahana Manajemen Pendidikan*, *11*(2), 173. https://doi.org/10.24036/jbmp.v11i2.119703

Hidayat, F., & Nizar, M. (2021). Model Addie (Analysis, Design, Development, Implementation and Evaluation) Dalam Pembelajaran Pendidikan Agama Islam. *Jurnal Inovasi Pendidikan Agama Islam (JIPAI)*, *1*(1), 28–38. https://doi.org/10.15575/jipai.v1i1.11042

Himawan, J. S., & Mubarok, H. (2023). Peningkatan Hasil Belajar Peserta Didik Melalui PBL Berbantuan Media Peran Pada Kelas IV. *Jurnal Ilmu Pendidikan Nasional (JIPNAS)*, *1*(1), 28–37. https://doi.org/10.59435/jipnas.v1i1.49

Jayanti, I., Rupa, I., Satyananda, I., Putra, I., Rema, I., Sumaria, I., … Badan Riset Inovasi Nasional (BRIN). (2022). Nilai Kearifan Lokal Dalam Upaya Pelestarian Kebudayaan Di Bali. *DHARMASMRTI: Jurnal Ilmu Agama Dan Kebudayaan*, *22*(2), 127–135.

Muhammad Wahyu Setiyadi, Ismail, H. A. G. (2017). Pengembangan Modul Pembelajaran Biologi Berbasis Pendekatan Saintifik Untuk Meningkatkan Hasil Belajar Siswa. *Journal of Educational Science and Technology (EST)*, *3*(2), 104.

Mustami, M. K. (2017). Validitas, Kepraktisan, dan Efektifitas Perangkat Pembelajaran Biologi Integrasi

Spiritual Islam Melalui Pendekatan Saintifik. *Al-Qalam*, *23*(1), 70–77. https://doi.org/10.31969/alq.v23i1.392

Ricu Sidiq, & Najuah. (2020). Pengembangan E-Modul Interaktif Berbasis Android pada Mata Kuliah Strategi Belajar Mengajar. *Jurnal Pendidikan Sejarah*, *9*(1), 1–14. https://doi.org/10.21009/jps.091.01

Rizawayani, S., Adelila Sari, S., & Safitri, R. (2017). Pengembangan Media Poster Pada Materi Struktur Atom Di Sma Negeri 12 Banda Aceh. *Jurnal Pendidikan Sains Indonesia*, *05*(01), 127–133.

Susanti, F. (2015). Pengembangan E – Modul dengan Aplikasi Kvisoft Flipbook Maker pada Pokok Bahasan Fluida Statis untuk Peserta Didik SMA/MA Kelas X. *Skripsi*, 234.

Wahyu, Y., Edu, A. L., & Nardi, M. (2020). Problematika Pemanfaatan Media Pembelajaran IPA di Sekolah Dasar. *Jurnal Penelitian Pendidikan IPA*, *6*(1), 107. https://doi.org/10.29303/jppipa.v6i1.344

Yunus, R. (2014). Nilai-Nilai Kearifan Lokal (Local Genius) Sebagai Penguat Karakter Bangsa. In *Deepublish Publisher*.