24 (1), 2023, 373-383

Jurnal Pendidikan MIPA

e-ISSN: 2685-5488 | p-ISSN: 1411-2531

http://jurnal.fkip.unila.ac.id/index.php/jpmipa/

Development of Character Education-Based Modules to Improve Student Learning Outcomes on Ecosystem Material

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Abstract: The research aims to develop educational, practical and effective character-based modules of valid, practical and effective ecosystem material. The study was conducted in SMAS Yayasan Reis Cendikia Tembung, Medan. In this study, research and development methods with model 4D. The results show assessments by experts at materials scored 92.31%, media experts at 96.43% and character education at 96.43% with valid and worthy criteria used in the learning process. Practical test results on the educators' response scores at 77.50% and learners at 78.63% which show modules are very practical to use. The module's application of learning results gained effective results with scoring a n-gain score of 0.73 with high criteria. Thus, the education-based core of ecosystem material is defined as valid, practical, and effective, and worthy of use in the learning process.

Keywords: modules, ecosystems, development, character education

Abstrak: *Penelitian ini bertujuan untuk mengembangkan modul berbasis pendidikan karakter materi ekosistem yang valid, praktis dan efektif. Penelitian ini dilakukan di SMAS Yayasan Reis Cendikia Tembung, Medan. Pada penelitian ini menggunakan metode research and development dengan model 4D. Hasil penelitian ini menunjukkan penilaian oleh ahli materi memperoleh skor sebesar 92,31% , ahli media sebesar 96,43% dan ahli pendidikan karakter sebesar 96,43% dengan kriteria valid dan layak digunakan dalam proses pembelajaran. Hasil uji kepraktisan respon pendidik memperoleh skor sebesar 77,50% dan peserta didik sebesar 78,63% yang menunjukkan modul sangat praktis untuk digunakan. Hasil penerapan modul terhadap hasil belajar peserta didik memperoleh hasil yang efektif dengan perolehan skor N-gain sebesar 0,73 dengan kriteria tinggi. Dengan demikian, modul berbasis pendidikan karakter materi ekosistem diartikan valid, praktis, dan efektif, serta layak digunakan dalam proses pembelajaran. .*

Kata kunci: *modul, ekosistem, pengembangan, pendidikan karakter*

▪ INTRODUCTION

Technological developments in the 21st century require educators to focus on supporting students to further develop a series of competencies and skills to change education in order to improve the quality of human resources (HR). The development of human resources (HR) in question is the integration of cognitive abilities and skills so that humans are able to adapt and compete in this technological era. Nowadays, the sophistication of technology cannot be denied, but there is still a lot of technology that is not used wisely and well, especially by students. The occurrence of moral crises such as social problems in society, student brawls, drug abuse, bullying and others which are very worrying involving children and teenagers as the nation's next generation. Conditions like this are an indicator of failure in forming a child's character within the family and school sphere (Wijaya et al., 2016).

According to UNICEF data, the student character survey carried out by the research and development center for religious and religious education in 2021 on average resulted

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DOI: http://dx.doi.org/10.23960/jpmipa/v24i1.pp373-3833
Received: 15 May 2023
Accepted: 20 July 2023
Published: 29 July 2023

in a decreasing index number compared to the previous year's index results. In 2021, the character index for secondary education students was at 69.52, down two points from the previous year's indicative figure of 71.41 (Najmudin et al., 2023).

In fact, character education is very important for children who are still in the world of education, because character education in the world of education is used as a forum or process to shape children into good individuals. As an educator, a teacher also needs to provide examples of good behavior to students, because teacher behavior is an example for students. In the world of education, character education is really needed by students to form individuals who are good, wise, honest, responsible and able to respect others (Sudaryanti, 2012). Character can also be termed character, psychological traits, morals or manners that differentiate a person from other people (Afriadi et al., 2013).

According to Thomas Lickona, character education is a deliberate effort that aims to help someone to build a strong nation, where people have noble, moral, tolerant and mutual cooperation so that they can understand, pay attention to and implement ethical values (Subawa & Mahartini, 2020) . Islam as a religion in this context has made character education the central point in its teachings, this is in accordance with the main mission of Islam itself in accordance with the words of the Prophet Muhammad SAW who said that "Indeed, I was sent to perfect morals." Character in Islamic terminology is more known as morality. So this article attempts to provide a view of Islam as a teaching in instilling character education which is sourced from the Al-Quran and Hadith which are the main guidelines in Islam (Riza, 2016).

Character education can be implemented by educators by developing learning through teaching materials which is one of the most important things to improve learning outcomes in the learning process. Because the quality of an education can essentially be seen through the learning process. So the most important thing that humans instill from an early age is character values through character education at school age (Sofyan, 2015).

To improve student learning outcomes, students need a suitable media to improve learning outcomes, namely modules that students can use independently so that they can improve student learning outcomes in learning and instill students' habits to repeat lessons (Musdalifa et al., 2021). Modules are independent learning media in which they consist of a series of learning experiences that are systematically designed to help students learn independently to achieve their own learning goals. With the use of learning modules can help students realize learning that improves student learning outcomes. The application of learning modules can condition learning activities to be more well-planned, not only looking at the teacher's activities, but also involving students in active learning as an alternative that is expected to be able to help students. By using the module, students can measure their level of mastery of the material discussed in each module unit (Riwanti & Hidayati, 2019).

Teaching materials are teaching materials that are prepared for the learning process systematically and developed so that teaching and learning activities occur in the classroom. Teaching materials are actually no longer difficult to obtain nowadays because they can be accessed via online and print media. One of the teaching materials that we can find online or in print is a module (Tanjung, 2022). Along with the increasingly rapid development of science and technology, the world of education is also developing rapidly. Students are required to be active and able to be independent in learning. The availability of facilities and infrastructure is sometimes insufficient to carry out independent learning

or cannot be utilized optimally as a learning resource. The availability of modules as teaching materials is quite easy to obtain, however the availability of character-based modules is still rare and rarely used as teaching materials in delivering learning material (Daryanto, 2014).

Regarding innovation in education, the development of learning modules is one of the innovative and creative efforts in the field of education, because in fact many things influence the quality of educational programs, including the quality of students, the quality of teachers, the availability of learning modules, curriculum, facilities and equipment. As a component of education, learning modules in various types are one of the factors that influence the quality of education (Kristianti & Julia, 2017). One of the steps that teachers must take is to develop modules that are internalized with character education values, such as learning modules that contain religious values that are presented as creatively and innovatively as possible in order to attract students' interest in learning in order to improve student learning outcomes (Revelation Kurniyawan et al., 2021).

A previous study regarding the development of teaching modules based on character education was carried out by (Devitri & Srimulat, 2021) resulting in a biology module on reproductive system material. Research (Putu Devi Efriani et al., 2016) produced a science module based on character education and research (Abdi & Anugraheni, 2012), produced a thematic module based on character education and this research has not tested its practicality and effectiveness in use. Based on the limitations of previous research, a practical character education-based module is needed that focuses on improving student learning outcomes in learning.

The objectives of this research are: (1) to determine the validity of character education-based modules (2) to determine the practicality of character education-based modules (3) to determine the effectiveness of character education-based modules. The biology module based on character education that is being developed is expected to be an interesting learning medium, and can motivate students' learning which cannot be separated from character education which needs to be instilled from an early age. And it can be used as a reference for teachers to innovate in biology learning.

The results of interviews with biology teachers in class especially regarding Biology learning at their school. So this problem encourages researchers to develop modules based on character education so that students can independently personalize the character values in the module, especially Ecosystem material. Therefore, researchers are interested in developing modules as auxiliary teaching materials that are developed according to school needs and can develop good character in students regarding biological concepts. Therefore, researchers are interested in conducting research entitled "Development of Character Education-Based Modules to Improve Student Learning Outcomes on Ecosystem Material".

▪ METHOD

Participants

The subjects of this research were limited to students in class X Science at SMAS Reis Cendikia Tembung Foundation, Medan, North Sumatra, totaling 31 people and 1 Biology teacher. The sampling technique in this study was through interviews, observation, questionnaires and tests. The following steps were used to select research subjects: (1) purposively selecting an area, (2) purposively selecting a school in the area

as a research location, and (3) selecting one of several existing classes to be used as a research subject. The purposive selection of regions, schools and classes makes it easier for researchers, because the purposive sample has been adapted to research needs. which will be used as interviewees for this research

Research Design and Procedure

This research includes the type of research and development (Research and Development) or R&D. In this study adapted the 4D development model with the stages of Define, Design, Develop, Disseminate (Thiagarajan Sivasailam, 1974). This model was adopted for the reason that this 4D development model can be used as a basis for developing learning tools with complete descriptions, the steps are arranged systematically and the research process does not require a long time. In this development, a product was also produced to develop teaching modules based on character education on Ecosystem material that was well qualified by paying attention to aspects of validity and practicality (Sugiyono, 2019).

Products are developed through the Canva application. This research procedure is a model developed by (Thiagarajan, Sivailam, D, 1974). The 4D development model consists of 4 stages, namely: (1) Define, this stage contains activities in the form of initial analysis of the identification of various needs and problems that exist in schools (2) Design, this stage aims to prepare the product to be developed as a learning tool by starting with selecting the module format, the material then formulating indicators and learning objectives then linking the material with character education in the module (3) Develop (development), at this stage the aim is to develop a product that has been designed and then validated by media experts, material experts and character education experts to determine the level of validity (4) Desseminate stage, the final stage of developing the 4D model, namely the stage of disseminating the results of the revised and validated product to determine validity, practicality, then testing the effectiveness of the product to improve participant learning outcomes educate. In the teaching and learning process, after the product has been revised and the results of its validity are known, the product is then disseminated (Arywiantari, D. et al., 2015).

Instruments

The data collection instruments used in this research were 1) validation sheets from media experts, material experts and character education experts 2) product user response questionnaires (teachers and students) 3) Pre-test and post-test questions to determine the effectiveness of the product in learning which is arranged based on indicators of achievement of competence.

The percentage calculation results from media experts, material experts, character education experts and product users are used as a basis for making product improvement decisions according to the Likert scale criteria in Tables 1, 2, 3 and 4.

Table 1. Validity assessment criteria

Persentase Rataan Skor (%)	Kriteria	Keterangan
75-100	Valid	Tidak Perlu Revisi
51-75	Belum Valid	Revisi Kecil
26-50	Belum Valid	Revisi Besar
0-25	Tidak Valid	Belum Dapat Digunakan

Practical analysis of the module can be seen based on the results of teacher and student responses. Calculation of the percentage of data obtained using the formula:

$$\text{Practicality} = \frac{\text{Score}}{\text{Maximum Score}} \text{x } 100\%$$

Table 2. Practicality assessment criteria

Percentage (%)	Criteria
76- 100	Very Practical
51- 75	Practical
26- 50	Less Practical
0- 25	Not Practical

The division for the N-Gain score itself is by category that has been determined. To measure the effectiveness of the module, the following are the assessment categories:

Table 3. N-Gain criteria

N-Gain	Category
$g > 0.7$	High
$0{,}3 < g \leq 0.7$	Middle
$g < 0.3$	Low

Meanwhile, the effective N-gain score interpretation category in the form of percent (%) can be referred to in table 4.

Table 4. N-Gain interpretation

Percentage (%)	Criteria
0.71-1.00	Very Effective
0.41-0.70	Effective
0.01-0.40	Less Effective

Data Analysis

The data obtained is in the form of quantitative and qualitative data (Sugiyono, 2017). Quantitative data were obtained from the results of validation tests by validators (media experts and material experts), practicality test results from the responses of product users (students and teachers) and effectiveness test results from the average value of the Post-Test and Pre-Test student learning outcomes. Qualitative data was obtained from suggestions, criticism and revisions obtained from media experts, material experts and product users.

▪ RESULT AND DISSCUSSION

Based on the research that has been carried out, namely teaching material development research aims to produce character education-based modules on ecosystem material to improve student learning outcomes. This research was conducted at the SMAS Reis Cendikia Tembung Foundation, Medan. Based on the research objectives, namely the feasibility test of learning media which consists of validation tests by validators (media experts, material experts and character education experts), practical test results from product users (educators and students), and effectiveness tests (pre-test and post -

test) to see student learning outcomes. Product development is carried out through several series of development processes, starting from the stages of definition, product design, product development and disseminate.

Defining Stage (Define)

Initial analysis is carried out by observing and obtaining problems faced in the learning process in the class where the research will be carried out. Researchers collected information regarding the modules in the school under study, with modules that were in accordance with the demands of the 2013 curriculum. This stage began by conducting observations and interviews with Biology teachers at SMAS Reis Cendikia Tembung Foundation, Medan. Based on observations and interviews with Biology teachers, it was revealed that the learning process was still teacher-centred, the use of teaching materials at school was only based on textbooks and LKS (Student Worksheets) and had never used other teaching materials such as modules. Student learning outcomes are relatively low, which encourages researchers to develop a character education-based module that can be used as evaluation material and can improve student learning outcomes.

Design Stage (Design)

This activity aims to produce an initial model (prototype) of the character education-based learning module that will be developed. The next step is to adapt the content to basic competencies and core competencies. Researchers also create an initial product design and then test it by validators, including media experts, material experts and user character education experts at the development stage (Sohilait, 2020).

This stage is used to select and design a format that suits the curriculum and materials used. Next, the researcher designed a validation sheet to validate the module that had been created so that it was suitable for use and tested in the field. Next, redesign the grid of teacher and student response sheets as well as questions to test the effectiveness of the module, namely pretest and posttest.

Development Stage (Develop)

After designing the module, at this stage validation of the module being developed is carried out and practicality and effectiveness testing continues after revision.

Module Validity Test Results

Validation was carried out by one material expert validator, one media expert and one character education expert. Based on the results of material expert validation data analysis, it is known that the total percentage score is 92.31% with valid criteria. The media expert validation results have a total percentage score of 96.43% with valid criteria. Meanwhile, the validation results from character education experts have a total percentage score of 96.43% with valid criteria. From the validation results of the three experts, it shows that the module developed is valid and suitable for use in learning.

After the character education-based module is validated by each validator, input and suggestions are obtained for module development. Based on this, researchers improved the character education-based module that had been developed in accordance with suggestions and input from expert validators. The suggestions and input for improvements resulting from the revision are shown in Figures 1 and 2.

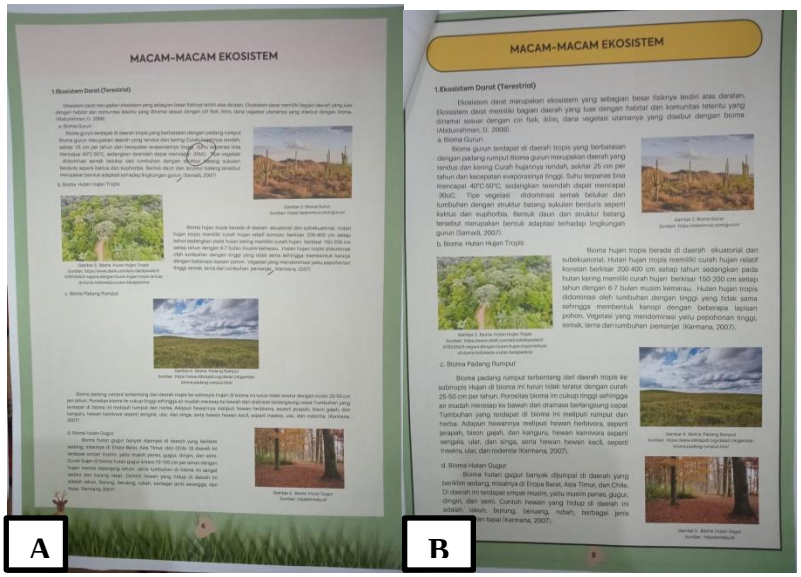

Figure 1. The results of the revision are in accordance with the suggestions of material experts; (A) before and (B) afte

Figure 2. Results of improvements in accordance with media expert suggestions; (A) before, and (B) after

Based on Figure 1 and 2, the material and media expert's assessment provides suggestions for improvements to add material on various ecosystems and improve the image on the cover of the module being developed.

Module Practicality Test Results

The practicality test of the module is determined by filling out teacher and participant response questionnaires after the module is used. Based on the results of the practicality analysis of teacher responses, it is known that the total score has a percentage of 77.50% with very practical criteria, while the practicality analysis of student responses

has a total score of 78.63% with very practical criteria. From the results of the practicality test, the responses of teachers and students show that the module developed is very practical and suitable for use in independent learning both at school and outside school.

Module Effectiveness Test Results

Testing the effectiveness of the character education-based module on ecosystem material was carried out by giving questions before and after using the module to 31 students. The effectiveness test is aimed at determining the effectiveness of the module as seen from student learning outcomes, namely by conducting a pretest and posttest by presenting 10 multiple choice questions given to students to determine the increase in student learning outcomes.

Analysis of initial ability data (pretest) was carried out to determine initial abilities before using character education-based modules. Meanwhile, learning outcomes data (posttest) is carried out to determine students' learning outcomes after using character education-based modules. The following is data from an analysis of the effectiveness test of character education-based modules for class X Science, which can be seen in Figure 1.

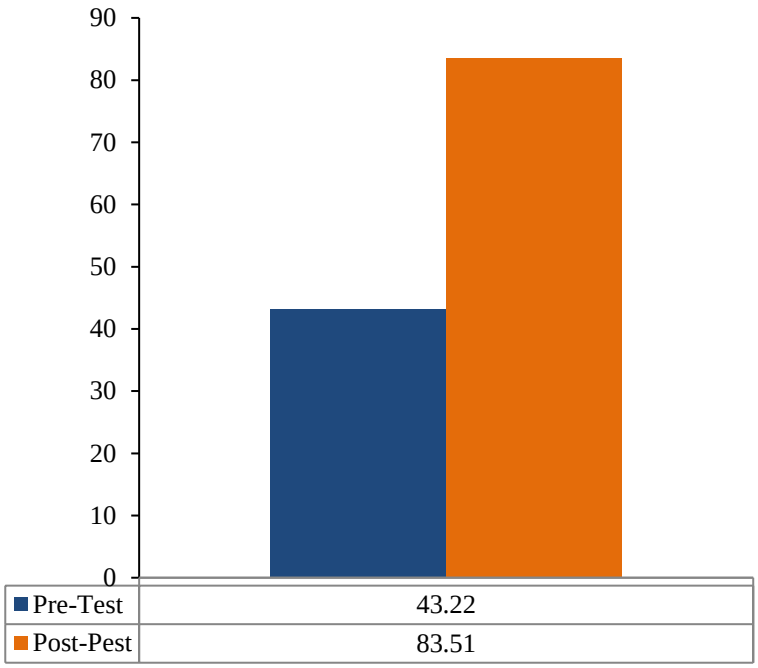

Figure 1. Improved student learning outcomes

Based on Figure 1, it can be seen that students' pretest and posttest scores increased. The average N-gain calculation obtained by students in the pre-test was 43.22 and the average post-test was 84.52. Increased learning outcomes after using character education-based modules with posttest scores higher than pretest scores. Then the effectiveness of using the module is tested through calculating the N-gain obtained from the students' pretest and posttest scores. The calculation of the average N-gain obtained is 0.73 and then converted into qualitative descriptive data according to the N-gain criteria, so that

based on this average it is included in the high criteria and the N-gain percentage value is 73.47% with the effective category (Akbar, 2017).

Stage of Dissemination (Disseminate)

The disseminate stage is the stage carried out after the product development stage. This stage is carried out by disseminating character education-based modules that are declared eligible to measure the feasibility of the module. At this stage the author carries out limited dissemination by distributing the final product in the form of a module to Biology subject teachers. Based on the experimental results, the module that has been developed is suitable for distribution to class X SMA and biology teachers. The distribution of modules for students is 31 people, where each person gets 1 module and 1 module for the teacher. The results of this experiment state that the modules developed are very practical and easy to apply. Therefore, character-based education modules can be applied in the process of independent learning activities both at school and at home outside of school. The limitations of this research still lie in the material used. The material raised still does not cover all class X high school material. This research only contains class X even semester material. Therefore, for further research, it is hoped that the material that will be used as a module will be expanded.

▪ CONCLUSION

Based on the results of the research that has been carried out, it is known that the development of character education-based modules on ecosystem material to improve student learning outcomes in biology learning was carried out in a validation test by three experts, namely validation of material experts, media experts and character education experts. for use with a percentage of 96.34% by material experts with a valid and suitable for use category, while for media experts with a percentage of 93.43% and character education experts with a percentage of 96.34%, a valid and suitable for use category. Practical to use, seen from the responses of educators and students, with an average of 77.50% for educators' responses in the very practical category and student responses with an average of 78.64% in the very practical category.

Furthermore, the effectiveness of the character education-based module is measured by the achievement of complete learning outcomes of students, namely the Pre-Test and Post-Test, calculated through the N-Gain score. The results obtained before and after using the module were with an average score of 43.22 for the Pre-Test while the Post-Test had an average score of 83.51. Next, to determine the effectiveness of the module, a normalized N-gain test was carried out. The score obtained from the Pre-Test and Post-Test results for class X SMAS is 0.73 because the N-gain is >0.7 in the high category. The N-gain percentage value obtained was 73.4% in the effective category and the module was suitable for use in the teaching and learning process.

▪ REFERENCES

Abdi, G. ., & Anugraheni, I. (2012). *Pengembangan modul tematik berbasis pendidikan karakter tema 6 cita-citaku. Jurnal Tematik, 11*(1), 1–8.

Afriadi, R., Lufri, & Razak, A. (2013). *Pengembangan modul biologi bermuatan pendidikan karakter pada materi sistem reproduksi manusia kelas Xi Sma. Pendidikan Biologi Kolaboratif, 1*(2), 19–30.

Akbar, S. (2017). *Instrumen perangkat pembelajaran (A.Holid (ed))* (pp. 161–163). PT. Remaja Rosdakarya.

Arywiantari, D., A., Agung, A. G., & Tastra, D. K. (2015). *Pengembangan multimedia interaktif model 4d pada pembelajaran ipa di Smp Negeri 3 Singaraja. Journal Edutech Universitas Pendidikan Ganesha Jurusan Teknologi Pendidikan*, *3*(1), 1–12.

Daryanto. (2014). *Menyusun modul bahan ajar untuk persiapan pendidik dalam mengajar*. Gava Media.

Devitri, S., & Srimulat, F. E. (2021). *Pengembangan modul biologi materi sistem reproduksi berbasis pendidikan karakter pada masa pandemi Covid-19. Jurnal Edu-Bio …*, *03*(02), 22–26.

Kristianti, D., & Julia, S. (2017). *Pengembangan perangkat pembelajaran matematika model 4d untuk kelas inklusi sebagai upaya meningkatkan minat belajar siswa*. *Jurnal MAJU*, *4*(1), 38–50.

Musdalifa, N., Syuhendri, & Pasaribu, A. (2021). *Pengaruh penggunaan multimedia interaktif berbasisi stem terhadap hasil belajar siswa. Jurnal Inovasi Dan Pembelajaran Fisika*, *8*(1), 73–84.

Najmudin, Syihabudin, Ma'zumi, & Jakaria. (2023). *Budaya sekolah dan efektivitasnya terhadap karakter religius peserta didik*. *JAWARA: Pendidikan Karakter*, *9*(1), 128–140.

Efriani, N. P. D., Parmiti, D. P., & Pudjawan, K. (2016). *Pengembangan modul ipa berorientasi pendidikan karakter pelajaran ipa kelas vii semester genap di smpn 1 negara. Jurnal Edutech Undiksha*, *4*(1).

Riwanti, R., & Hidayati, A. (2019). *Pengembangan modul pembelajaran tematik berbasis pendidikan karakter di kelas V Sekolah Dasar. Jurnal Basicedu*, *3*(2), 572–581.

Riza, M. (2016). *Pendidikan karakter dalam perspektif islam*. *Jurnal As-Salam*, *1*(1), 73–82.

Setyaningsih, N., & Mukodimah, T. D. (2022). Pengembangan Instrumen Asesmen Higher Order Thinking Skills (Hots) Berbasis Literasi Matematika Pada Materi SPLDV. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *11*(3), 1739.

Sofyan, S. (2015). *Pendidikan karakter*. Alfabeta.

Sohilait, E. (2020). *Metodologi penelitian pendidikan matematika*. Cakra.

Subawa, P., & Mahartini, K. (2020). *Konsentrasi paradigma pendidikan parakter Thomas Lickona pada Sekolah*. *Haridracarya: Jurnal Pendidikan Agama Hindu*, *1*(2), 149–160.

Sudaryanti. (2012). *Pentingnya pendidikan Karakter Pendidikan Anak.* Jurnal Pendidikan Anak. *Jurnal Pendidikan Anak*, *1*(1), 11–16.

Sugiyono. (2017). *Metode penelitian kuantitatif, kualititatif dan R&D*. CV. Alfabeta.

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*.

Sundayana, R. (2020). *Statistik penelitian pendidikan (Edisi ke-2)*. Alfabeta.

Tanjung, I. F. (2022). *Penelitian Tindakan Kelas*. Prodi Tadris Biologi UINSU Medan.

Thiagarajan Sivasailam, D. S. S. (1974). *Instructional development for training teacher of exceptional children, minneapolis*. National Center for Inprovement Educational System.

Wahyu Kurniyawan, Muflikhul Khaq, & Titi Anjarini. (2021). *Pengembangan modul digital terintegrasi nilai-nilai pendidikan karakter pada subtema 1 Suhu dan Kalor*.

Jurnal Educatio FKIP UNMA, *7*(3), 1280–1288.
Wijaya, E. Y., Sudjimat, D. A., & Nyoto, A. (2016). *Transformasi pendidikan abad 21 sebagai tuntutan. Jurnal Pendidikan*, *1*, 263–278.