

Electronic Module Development Science-Based Learning Flipbook Theory System Breathing in Humans for Student Class VIII SMP/MTs

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Abstract: This research is motivated by the need for teaching materials in the form of science learning modules that utilize information and communication technology. This study aims to develop an electronic module (E-Module) based on flipbook material on the human respiratory system for class VIII SMP/MTs students. The method used in this study uses a 4D development model (Define, Design, Development and Dissemination). In this study was limited only to the stage of small-scale trials. The instruments used are interviews as an initial needs analysis, a validation questionnaire on the feasibility of the E-Module and a student response questionnaire to the E-Modul. The data analysis technique is descriptive qualitative analysis. To find out the results of the product feasibility test, it was assessed by 3 material experts, 3 media experts and 1 science teacher and the responses of seven students of MTs TQ El-MunaQ Pajangan Bantul. The data from the product feasibility analysis were assessed by material experts, media experts and science subject teachers by calculating the percentage of achievement in each component, namely the feasibility of the material obtained by an overall average of 95.34% with the "very feasible" category, media feasibility obtained on average an overall average of 87.27 % with the "very feasible" category, the assessment of science subject teachers obtained an overall average of 73.33% with the "adequate" category. Then the results of student responses by calculating the percentage of achievement in each component obtained an overall average of 91.8%. Based on these data, it can be concluded that the flipbook -based E-Module material on the human respiratory system for class VIII SMP/MTs students is feasible to use and students are interested in using it as a science learning medium to support the teaching and learning process.

Keywords: Electronic module; Flipbook; Science learning

Introduction

Indonesia has entered the era of the industrial revolution stage 4.0 by building society through education and literacy efforts, especially information and communication technology. Competing in today's digital era, Indonesia needs to improve the skills and capabilities of its human resources through education (Syamsuar et al., 2018). Learning media and administrative tools can be used as a form of implementation of technology (Lestari, 2018). Technology used in the education system allows a learning process without face-to-face, but must still refer to the main goal, namely to significantly improve the

quality of learning and learning and increase information technology literacy (Asmawi et al., 2019).

The development of science in the 21st century, technology and information is very fast and full of competition, including the world of education. As a form of effort to fortify, anticipate, and prepare to face the current competition of globalization in the 21st century, the Indonesian people must prepare well, and grow and develop various supporting competencies (Sudarmin et al., 2019). One of the preparation and development of these competencies is inseparable from the world of education and its units. The development of this increasingly modern era also occurs in science learning in schools. Natural science (IPA) is a vehicle for

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students to understand themselves and their environment, so that they can be developed in everyday life (Andriana et al., 2020). Good mastery of science concepts helps students in dealing with problems in everyday life. Therefore, educators need to provide facilities to students so that they can learn optimally.

One of the needs that must be developed to achieve optimal learning is teaching materials. Finch et al. (2006) suggests that teaching materials are a resource that can assist educators in delivering desired behavioral changes in students. In addition, teaching materials are materials used to assist educators in carrying out teaching and learning activities in the classroom, teaching materials in the form of modules are one of them (Majid, 2009). This explanation is supported by an explanation (Mulyasa, 2005) that one of the ways used to utilize technology in the education system is to develop learning modules, because the module is a learning medium that is designed systematically to help students achieve learning objectives.

The module is a teaching material whose contents are quite short and specific which are arranged to achieve learning objectives. Usually, the module has a well-structured series of activities related to materials, media and evaluation (Meyer, 1978). This explanation is also supported by research Nurbaeti (2020) explaining that the module is a teaching material that is systematically arranged in language that is easily understood by students according to their level of knowledge and age, so that students can learn independently with minimal teaching from teacher.

Learning that has started completely online, of course, requires appropriate teaching materials by utilizing advances in information and communication technology. Coupled with almost every student from elementary to high school already has a gadget and uses it for everyday life. This condition can be used and used as a challenge for teachers to use gadgets as a learning support tool. Along with the development of science and technology, the module has been transformed into an electronic module. This electronic module is a module that can be accessed through gadgets, laptops, computers, etc. Electronic modules contain text, images, video and audio which are very suitable for use in learning systems that utilize information and communication technology.

Based on a needs analysis through a question and answer session with several students of MTs TQ El MunaQ Pajangan Bantul, it is known that one of the subject matter that is considered difficult and contains many concepts is science subjects. Science lessons are considered as abstract lessons, students are required to imagine a concept that they have never learned before. Among the materials that are considered difficult are heat, energy, and the human respiratory system. In addition, the teaching materials used in schools are

student worksheets (LKS) and textbooks. The LKS books used are in the form of books with sheets of opaque paper and textbooks which are considered too much material so that it often makes students bored in reading. Therefore, students need additional teaching materials in the form of electronic learning modules that contain a complete, innovative, interesting explanation of the material and can be used by students in the learning process.

Based on this explanation, teaching materials are very important and become the needs of students so that electronic science teaching materials are developed to be used as additional innovative learning resources. In addition, this electronic module can facilitate learning interactions anywhere and anytime so that learning is more flexible. Researchers conducted development research to develop a flipbook -based digital science learning module that limited to the material of the human respiratory system. The electronic module (E-Module) developed is a module that is made digitally in the form of a flipbook as teaching material in the form of an electronic book (e-book) that can be opened sheet by sheet and is supported by animations, pictures, videos that support the content of the material (Khasanah et al., 2021). Flipbook has the advantage of being able to provide a flip effect module (pages that can be flipped) apart from that flipbooks are also very easy to make, and the display module is not only in the form of text and images but can also be supported by video, audio supporting material. The resulting product can also be published in SWF (Shock Wave Flash) format, HTML (Hyper Text Markup Language) if it will be published through the website (Anandari et al., 2019).

Several previous studies have developed electronic modules as learning resources (Ferdianto et al., 2019; Pilt et al., 2007; Sugianto et al., 2017). However, a flipbook-based science electronic module has not yet been developed which is limited to material on the respiratory system in humans. Therefore, researchers conducted development research aimed at developing an E-Module based on flipbook material on the human respiratory system for class VIII students of SMP/MTs.

Method

This research is a type of development research using a 4D development model (Define, Design, Development and Dissemination), but in this study only apply 3 steps, namely Define, Design, and Development. The following is a picture of the research flow that will be carried out:

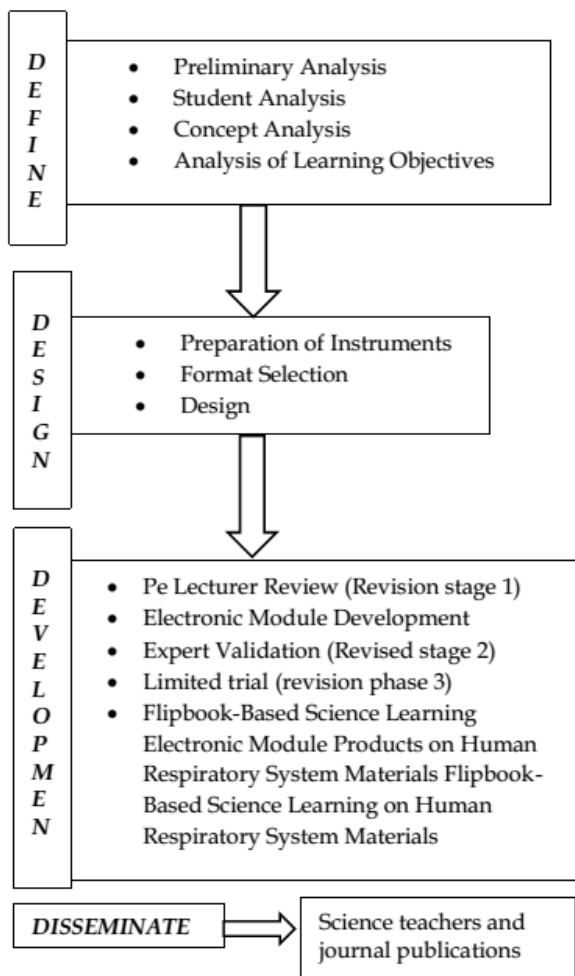


Figure 1. Research flow design

This research is limited to product development, product feasibility testing, and testing the practicality of using the product. The aim of the study was to develop an E-Module based on flipbook material on the human respiratory system for grade VIII SMP/MTs students. This research was carried out at MTs TQ EI MunaQ Pajangan Bantul on the respiratory system in humans in April 2022. This research involved several parties, namely the subject of a feasibility test by 3 material experts, 3 media experts who were Postgraduate students of the University Science Education Study Program, Yogyakarta State, and one science teacher at MTs Tamrinut Thullab Kudus and class VIII student at MTs TQ EI MunaQ Pajangan Bantul.

Data analysis techniques used in this study were interviews and questionnaires. Interviews were conducted by researchers to obtain preliminary information by asking several questions to the students of MTsTQ EI-MunaQ Pajangan Bantul. Then the questionnaire or questionnaire used in this study was a product feasibility questionnaire sheet by material experts, media experts and science teachers and student response questionnaire sheets. Student response questionnaires were used to determine the practicality

of the E-Module from the responses or comments given by students on the questionnaire sheet.

Table 1. Expert Validation Assessment Score and Student Response (Sugiyono, 2015)

| Information | Score | Criteria |
|-------------|-------|------------|
| SB | 5 | Very Good |
| B | 4 | Well |
| C | 3 | Enough |
| K | 2 | Not enough |
| SK | 1 | Very less |

The data analysis technique used is descriptive qualitative data analysis. The expert eligibility questionnaire sheet was made by containing several Likert scale questions consisting of 5 assessment scores, then the questions were filled out by the validator by choosing between the 5 scores. The results of the E-Modul feasibility assessment that have been obtained are analyzed using the Formula 1 (Widoyoko, 2012).

$$P = \frac{\text{The number of validator answer scores}}{\text{Maximum total score}} \times 100 \% \quad (1)$$

The average score is then interpreted based on the eligibility level categories presented in table 2.

Table 2. Percentage of E-Module Eligibility Criteria

| Evaluation | Criteria |
|--------------|--------------------|
| 81 P < 100 % | Very Worthy |
| 61 P < 81 % | Worthy |
| 41 P < 61 % | Decent enough |
| 21 P < 41 % | Not feasible |
| 0 P < 21 % | Very Inappropriate |

The developed E-Module teaching materials are declared theoretically feasible if the percentage of eligibility is 51%.

Furthermore, this student response questionnaire sheet was made by containing several Likert scale questions consisting of 5 assessment scores, then the questions were filled out by students by choosing between the 5 scores. The results of the E-Module feasibility assessment that have been obtained are analyzed using the Formula 2 (Widoyoko, 2012). The average score is then interpreted based on the eligibility level categories presented in Table 3.

$$P = \frac{\text{Total score obtained}}{\text{Maximum total score}} \times 100 \% \quad (3)$$

Table 3. Percentage of E-Module Attractiveness Criteria

| Evaluation | Criteria |
|--------------|-------------|
| 81 P < 100 % | Very good |
| 61 P < 81 % | Well |
| 41 P < 61 % | Pretty good |
| 21 P < 41 % | Not enough |
| 0 P < 21 % | Very less |

Results and Discussion

Results

The results of this study describe the results of developing an E-Module based on flipbook materials for the human respiratory system for class VIII SMP/MTs students using the 4D development model but limited to the development stage (defelopment) as well as the results of the feasibility assessment of the E-Module product and the results of student responses.

The development of the E-Module product is carried out in accordance with the stages of definition, planning, and development. Here is an explanation of all these stages:

Definition Stage (Define)

Needs analysis

Analysis of product development needs is an important thing to do to ensure that the product to be developed is in accordance with user needs (Rusdi, 2019). This stage is the initial stage in research to analyze the need for using flipbook-based E-Modules. Needs analysis was conducted to collect information about students' learning needs and the characteristics of the modules used as alternative learning resources for students.

Analysis need to do is analysis participant educate. Analysis needs beginning this conducted using interview guidelines to seven students of MTsTQ El MunaQ Pajangan Bantul. The results of the needs analysis based on interviews with 7 students can be seen in table 4.

Table 4. Results of Student Needs Analysis

| Aspect asked | Student Answer Results |
|---|---|
| Use of learning resources for science sub-chapter vital lung capacity | Only use package books and worksheets |
| Student interest in the textbooks used | The use of thick and monotonous textbooks coupled with colorless worksheets and using opaque paper makes students less interested |
| Difficulties experienced in the learning process and practicum | There is no practical manual even though most students prefer to carry out science practicum |
| Use of online Modules (E-Modules) | No online/electronic books from school |
| The need for digital teaching materials | All students stated that they needed digital teaching materials to support an interesting and innovative science learning process |

Based on the results of the analysis of student needs, it can be seen that students experience a lack of learning resources in studying science lessons.

Design Phase (Design)

The design stage aims to design the E-Modul to be developed. The steps taken at this stage are:

Material preparation

At this stage the researcher chose material that was in accordance with the syllabus used at MTs TQ Pajangan Bantul. The material presented and developed in a flipbook-based E-Module is material on the human respiratory system. The content contained in this E-Module is a book cover, basic competencies and objectives based on the 2013 curriculum, the material for the human respiratory system, evaluation questions, conclusions and bibliography. Then the learning model in the E-Module used is a scientific approach, the selection of the model used is adjusted to the student worksheet reference book which contains the syntax of a scientific approach, namely observing, asking, associating, exploring and communicating.

Format selection

The format of the electronic module (e-module) is developed according to the needs that exist at the planning stage. The e-module design was produced by researchers as the initial product of developing electronic modules (e-modules). The format used to develop this E-Modul product is using the Canva design application with A4 paper size, font size 24 and various types of letters. The results are then converted into an electronic book with additional images and videos to support the material using the Heyzine Flipbook application. The following e-module cover design can be seen in figure 2.

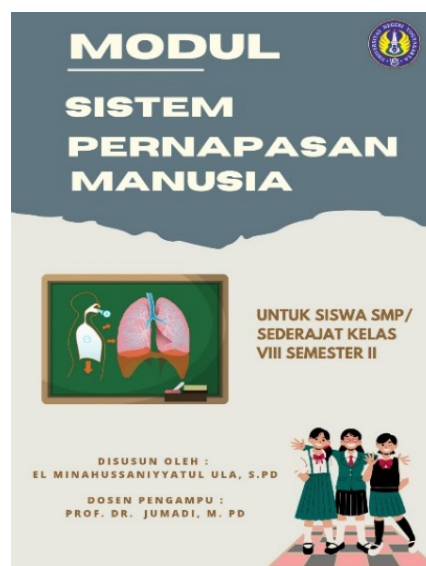


Figure 2. Design of the e-module cover

Development Phase (Development)

At this stage of development, researchers have produced products that have been planned to be developed. Things that are done at this stage include assessment by Experts (Expert Review), namely postgraduate students of Science Education, State University of Yogyakarta and 1 science teacher at MTs Tamrinut Thullab Kudus, which includes validators of material experts and media experts. Next is the response from students (Small Group Evaluation).

Assessment Results by Material Experts, Media Experts and Science Subject Teachers

Expert validation of the E-Modul aims to determine the feasibility assessment of material experts, media experts and science subject teachers on the products developed by researchers. The data obtained is then converted into a percent value and then adjusted according to the criteria that are appropriate or not suitable for use. The results of the validation of the feasibility of the product are shown in the table and the following figure.

Table 5. Material Expert Assessment

| Component | Average | Category |
|---|---------|-----------|
| Scope Theory | 96.67% | Very Good |
| Linkages with Curriculum | 96.67% | Very Good |
| Suitability with B. Indonesia and Development Student | 93.33% | Very Good |
| Coherence and Cohesiveness of Plot | 94.67% | Very Good |
| Overall Average | 95.34% | Very Good |

Table 6. Media Expert Rating

| Component | Average | Category |
|------------------|---------|-----------|
| Design Quality | 88.13% | Very Good |
| Post Display | 87% | Very Good |
| E-Module Quality | 86.67% | Very Good |
| Overall Average | 87.27% | Very Good |

Table 7. Science Subject Teacher Assessment

| Component | Average | Category |
|--------------------------|---------|-------------|
| Quality Appearance | 86.67% | Very Good |
| Linkages with Use | 60% | Enough Well |
| Linkages with Curriculum | 70% | Well |
| Scope Theory | 80% | Very Good |
| language | 70% | Well |
| Overall Average | 73.33% | Well |

Based on the data from the feasibility assessment by 3 material experts, 3 media experts and 1 science teacher in the table above, the E-Module developed by the researcher is stated by the percentage of achievement in each component, namely the feasibility of the material obtained by the overall average by 95.34% with the "very good" category, the media feasibility obtained an overall average of 87.27 % with the "very good" category, the assessment of science subject teachers obtained an overall average of 73.33% with the "good" category". If it

is matched with the product eligibility criteria table, then the achievement score of the feasibility assessment results by material and media experts is very feasible while the feasibility assessment by science subject teachers is a feasible category. Thus, the expert validator gives a very good assessment by adding some input and suggestions, here is a table of suggestions for improvement from the validator, namely.

Table 8. E-Module Product Improvement Suggestions by Validator

| Repair Suggestions | Follow-up |
|---------------------|---|
| Enlarged video size | Enlarged material and experiment video size |
| Added Image | Added a picture of the lungs and some supporting material |
| | other supporting material images |

Group Evaluation Results

The product was tested on seven students of MTs TQ El MunaQ Pajangan Bantu to further strengthen the practicality of interactive E-Modules. The results can be seen in the following table:

Table 9. Response Student against E-Module

| Component | Average (%) | Category |
|------------------------|-------------|-----------|
| Module Design | 92.7 | Very Good |
| Videos and Pictures | 91.4 | Very Good |
| Language | 91.4 | Very Good |
| Theory | 94.3 | Very Good |
| Interest | 93.1 | Very Good |
| Increase Understanding | 87.9 | Very Good |
| Overall Average | 91.8 | Very Good |

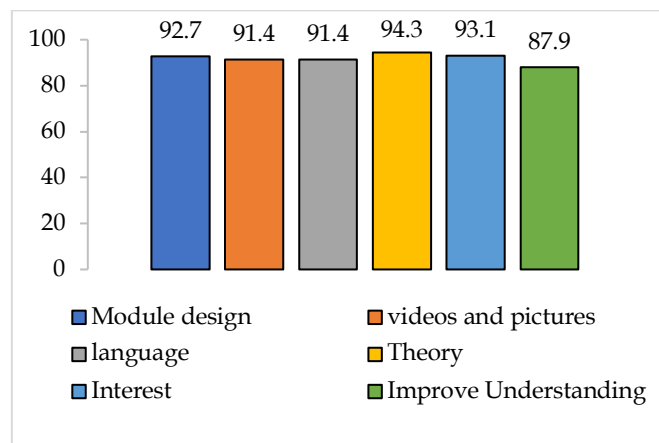


Figure 3. Response student against E-Module

Based on the results of the student responses above on each component, it can be seen that the student response to the module design component is 92.7%, videos and pictures 91.4%, language 91.4%, material 94.3%, interest 93.1%, and improve understanding 87.9%. So that students' responses to the E-Module which are described based on several components get an average of 91.8% with a very good category.

Discussion

This research is a type of development research. This research was conducted in several stages, namely defining (define), planning (design) and developing (development). This study aims to produce an E-Module based on flipbook material on the human respiratory system for class VIII SMP/MTs students which will be developed by researchers to obtain eligibility based on eligibility criteria according to experts, teachers and get good grades based on student assessment criteria. This E-Module is structured based on basic competencies, core competencies and achievement indicators according to the 2013 curriculum, and is equipped with a learning process syntax for modules with a scientific approach.

The initial stage of the study was a needs analysis in the form of an analysis of student needs by conducting interviews with seven students of MTs TQ El MunaQ Pajangan Bantul. Based on the results of these interviews, students felt that the learning resources used in schools were only limited to printed books which were considered less attractive and wanted learning resources that utilized the use of ICT (Information and Communication Technology) such as electronic books (E-books).

The second stage is product design. The steps taken in designing the product are researchers compiling a flipbook-based E-Module content design, starting from the cover, introduction, concept map, content material, practice questions, and a glossary. After preparing the composition of the contents of the E-Modul, then proceed with preparing supporting software for the product manufacturing process and also making a flipbook -based display/background design for the E-Module.

In the third stage, the materials for the design of the E-Module were carried out at the design stage, then the creation and development of a flipbook-based E-Module was carried out with Canva. After the E-Module is created, it is then converted from a pdf file into a flipbook using the Heyzineflipbook online application. The e-Module based on a scientific approach was then tested from the expert review and small group evaluation stages.

The designed E-Module product is continued with expert validation to determine the feasibility of the E-Module product. This is related to what was stated by Sugiyono (2015) which states that validation is an activity process to assess whether the product design is feasible or not to be used. The expert review stage of the flipbook-based E-Module received a product assessment with a very decent category from 3 material experts at 95.34% and 3 media experts at 87.27% and a proper category by one science teacher, namely of 73.33% by making some improvements. Fixed matters related to

adding images that match the material and increasing the size of the E-Module video.

In the small group evaluation stage, the researcher conducted a practical test of the use of the improved E-Modul on seven students of MTsTQ El MunaQ Pajangan Bantul where each student was given a practicality questionnaire. They commented that the E-Module was interesting and good. The value generated from the student's response is 91.8% with a very good category.

Based on the results of product validation and testing, the flipbook -based E-Module material on the human respiratory system for class VIII SMP/MTs students is declared feasible and very good for use in science learning at MTsTQ El MunaQ Pajangan Bantul and can be used as a learning resource/teaching materials by teachers and students. It is hoped that this E-Module can provide student-centered learning where students can be more active in learning, such as observing, actively asking questions, forming links in memory, exploring the material being studied and being able to communicate their findings.

Conclusion

Based on the results of the research and discussion that have been submitted, it can be concluded that the results of the feasibility analysis of the product assessed by material experts, media experts and science subject teachers by calculating the percentage of achievement in each component, namely the feasibility of the material obtained an overall average of 95.34% with the "very feasible" category, the media feasibility obtained an overall average of 87.27 % with the "very feasible" category, the assessment of science subject teachers obtained an overall average of 73.33% with the "adequate" category. Then the results of student responses by calculating the percentage of achievement in each component obtained an overall average of 91.8%. Based on these data, it can be concluded that the flipbook-based E-Module material on the human respiratory system for class VIII SMP/MTs students is feasible to use and students are interested in using it as a science learning medium to support the teaching and learning process.

Reference

- Anandari, Q. S., Kurniawati, E. F., Marliana, M., Piyana, S. O., Melinda, L. G., Meidiawati, R., & Fajar, M. R. (2019). Development of Electronic Module: Student Learning Motivation Using the Ethnoconstructivism-Based. *Jurnal Pedagogik*, 6(2), 416–436. <https://doi.org/10.33650/pjp.v6i2.584>
- Andriana, E., Ramadayanti, S., & Noviyanti, T. E. (2020). Pembelajaran IPA di SD Pada Masa Covid 19. *Prosiding Seminar Nasional Pendidikan FKIP*, 3(1),

- 409–413.
<https://jurnal.untirta.ac.id/index.php/psnp/article/view/9961>
- Asmawi, Syafei, & Yamin, M. (2019). Pendidikan Berbasis Teknologi Informasi Dan Komunikasi. *Prosiding Seminar Nasional Pendidikan*, 3, 50–55. <https://jurnal.univpgri-palembang.ac.id/index.php/Prosidingpps/article/view/2930>
- Ferdianto, F., & Nurulfatwa, D. (2019). 3D Page Flip Professional: Enhance of Representation Mathematical Ability on Linear Equation in One Variable. *Journal of Physics: Conference Series*, 1188(1), 12043. <https://doi.org/10.1088/1742-6596/1188/1/012043>
- Finch, R. C., & Crunkilton R, J. (2006). *Curriculum development in vocational and technical education*. Polytechnic Institute and State University.
- Khasanah, I., & Nurmawati, I. (2021). Pengembangan Modul Digital sebagai Bahan Ajar Biologi untuk Siswa Kelas XI IPA. *Indonesian Journal of Mathematics and Natural Science Education*, 2(1), 34–44. <https://doi.org/10.35719/mass.v2i1.57>
- Lestari, S. (2018). The Role of Technology in Education in the Era of Globalization. *Edureligia; Journal of Islamic Religious Education*, 2(2), 94–100. <https://doi.org/10.33650/edureligia.v2i2.459>
- Majid, A. (2009). *Learning Planning*. PT. Rosdakarya Youth.
- Meyer, R. (1978). *Designing learning modules for inservice teacher education*. Centre for Advancement of Teaching.
- Mulyasa, E. (2005). *Implementation of the 2004 Curriculum KBK Learning Guide*. Rosdakarya Youth.
- Nurbaeti, R. U. (2020). Pengembangan Modul Praktikum Ipa Berbasis Kurikulum 2013 Untuk Mahasiswa Pendidikan Guru Sekolah Dasar. *Jurnal Elementaria Edukasia*, 3(1), 109–116. <https://doi.org/10.31949/jee.v3i1.2115>
- Pilt, L., Tartes, T., & Marandi, T. (2007). Tool for creating learning modules developed on the basis of open source OpenScholar software. *EUNIS Journal of Higher Education*. <https://dspacecris.eurocris.org/handle/11366/484>
- Rusdi, M. (2019). *Educational Design and Development Research*. PT Raja Grafindo Persada.
- Sudarmin, S., Zahro, L., Pujiastuti, S. E., Asyhar, R., Zaenuri, Z., & Rosita, A. (2019). The development of PBL-based worksheets integrated with green chemistry and ethnoscience to improve students' thinking skills. *Jurnal Pendidikan IPA Indonesia*, 8(4), 492–499. <https://doi.org/10.15294/jpii.v8i4.17546>
- Sugianto, D., Abdullah, A. G., Elvyanti, S., & Muladi, Y. (2017). Modul Virtual: Multimedia Flipbook Dasar Teknik Digital. *Innovation of Vocational Technology Education*, 9(2), 101–116. <https://doi.org/10.17509/invotec.v9i2.4860>
- Sugiyono. (2015). *Research Method Education: Quantitative Approach, Qualitative, and R&D*. Alfabeta.
- Syamsuar, & Reflianto. (2018). Pendidikan dan Tantangan Pembelajaran Berbasis Teknologi Informasi di Era Revolusi Industri 4.0. *Jurnal Ilmiah Teknologi Pendidikan*, 6(2), 1–13. <https://doi.org/10.24036/et.v2i2.101343>
- Widoyoko, S. E. (2012). *Research Instrument Development Techniques*. Learning Library.