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DESIGN OF E-MODULE DEVELOPMENT BASED ON PROJECT-BASED LEARNING IN THE DIGITAL TECHNOLOGY COURSE OF MATHEMATICS LEARNING

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ABSTRACT

Current learning in Mathematics Education S2 Study Program of UM Metro is carried out by hybrid learning, but the teaching materials used are like offline learning. They experience difficulties where tasks that are supposed to produce products but only describe the stages of obtaining the product. Therefore, need analysis and project-based e-module development design are needed. The purpose of this research is to conduct a need analysis and design the development of e-modules based on project-based learning. The research method used is research and development, namely need analysis and design, through questionnaires and interviews with 10 students in Mathematics Education S2 of UM Metro. The results showed that: the module used was still simple or looking for material via the internet, the task was still answering questions not in the form of a project. so that the need for project-based learning-based e-modules, project-based learning-based e-module design, contains a module cover, instructions for using the module, learning outcomes and objectives, material and tasks using project-based learning steps, which were converted using flipbook maker. In conclusion: 1) The need for developing e-modules based on project-based learning, 2) the results of the e-module design can be used or developed further.
***Keywords**: e-module; development design; project-based learning*

ABSTRAK

Perkembangan teknologi menuntut inovasi dalam pembelajaran, termasuk penggunaan bahan ajar digital seperti e-modul. Namun, bahan ajar yang digunakan saat ini masih bersifat konvensional, dimana tugas-tugas pembelajaran lebih banyak berupa penyelesaian soal teoritis daripada proyek aplikatif. Hal ini menyebabkan kurangnya keterlibatan aktif mahasiswa dalam proses pembelajaran. Berdasarkan observasi awal terhadap mahasiswa S2 Pendidikan Matematika UM Metro, ditemukan bahwa: Modul yang digunakan masih sederhana atau bersumber dari pencarian internet, tugas pembelajaran lebih sering berupa pertanyaan tertutup (close-ended) daripada proyek berbasis masalah, belum ada e-modul yang dirancang khusus dengan pendekatan project-based learning (PjBL) untuk mendorong kreativitas dan kolaborasi. Oleh karena itu, penelitian ini bertujuan untuk menganalisis kebutuhan pengembangan e-modul berbasis PjBL, merancang desain e-modul interaktif yang memfasilitasi pembelajaran berbasis proyek. Metode penelitian menggunakan pendekatan Research and Development (R&D) dengan tahap analisis kebutuhan dan desain. Data dikumpulkan melalui kuesioner dan wawancara terhadap 10 mahasiswa. Hasilnya menunjukkan e-modul yang memuat petunjuk penggunaan yang jelas., mengintegrasikan langkah-langkah PjBL (mulai dari perencanaan hingga evaluasi proyek). Dikemas secara digital menggunakan flipbook maker untuk meningkatkan interaktivitas. Diharapkan e-modul ini dapat menjadi solusi dalam meningkatkan keterampilan berpikir kritis dan kolaborasi mahasiswa melalui pembelajaran berbasis proyek.
***Keywords**: desain pengembangan; e-modul; projek based learning*

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Introduction

The purpose of education is to create a learning atmosphere and learning process so that students can actively develop their potential. Regulation of the Minister of Education and Culture number 3 of 2020 concerning National Higher Education Standards states that the development of potential through the learning process is carried out with standards, namely: characteristics, planning and implementation of the learning process and student learning load (Permendikbud No. 3, 2020) . Mathematics Learning Digital Technology lectures are carried out in the Mathematics Education Masters study program.

Based on observations made to students who took Digital Technology for Mathematics Learning, it was found that they experienced difficulties, especially when given tasks to be completed by students. Tasks that should produce products but only describe the stages of obtaining products. In online lectures, the teaching materials used are the same as face-to-face lectures, so that during the online learning process students find it difficult to understand and complete tasks.

Teaching materials are materials that contain learning materials that will be taught to students. Teaching materials must be tailored to the needs and characteristics and be able to change the behavior of students. Teaching materials contain learning objectives, teaching materials, exercises and evaluations (Kholisho, 2017). Several types of teaching materials such as books, worksheets, modules and so on. Modules are teaching materials that are systematically arranged which can be used individually or in groups, which include content, material, methods and evaluation of learning (Syafri, 2018) . Modules are teaching materials that are systematically arranged and attractive, which include material, methods, and evaluations that can be used independently and more objectively (Aufa et al., 2020). The utilization of instructional modules has been shown to improve learners' problem-solving capabilities while simultaneously increasing engagement and creating more meaningful learning experiences (Yani, Anwar & Vahlia, 2022).Modules are independent teaching materials arranged systematically to attract students. The module aims to enable students to learn independently without assistance from lecturers, so that students can achieve their learning goals.

Learning modules must be able to be used independently, students can learn without the help of lecturers and can accommodate the ability level of students. Modules can be presented in the form of e-learning, namely using e-modules. E-modules or electronic modules are teaching materials in the form of modules using technology and innovation, packaged with electronic devices (Istikomah, et al., 2020). This e-module is a systematically arranged digital learning media that can be used by students so that they can learn independently (Diantari, 2018) . A module is a type of instructional material designed for independent learning by students (Krisnanti, Rizki & Vahlia, 2020).

E-modules are teaching materials that are systematically designed to be used by students independently and presented in electronic formats such as computers, laptops, tablets and even smartphones. Teaching materials are presented in the form of one unit or several units of learning material and each learning process is connected by links. The advantages of using e-modules are: (1) Can foster student motivation. (2) Knowing which material has been completed or not completed. (3) The subject matter in one semester can be divided evenly. (4) Learning materials

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are arranged according to academic levels. (5) Modules are more interactive. (6) Video, audio, and animation can be added to the module so that the verbal element is reduced (Putri, and Usmeldi, 2020). E-modules can be created using various applications including: sigil, e-pub, canva, flipbook maker and so on.

Flipbook Maker is an application that allows users to create interactive digital books that resemble physical books, with the ability to insert text, images, video, and sound, thus creating a more engaging and dynamic learning experience (Triwahyuningtyas et al., 2020; Aprianis et al., 2022). E-modules can improve students' cognitive and psychomotor scores (Taqwina et al., 2023) , very valid with a value of 95% and can be used in learning (Husnah, 2023). In addition, the use of flip book maker can increase student creativity and provide a more interesting learning experience (Widjayanti et al., 2018). Research by Amalina et al. (2019) also shows that students who use flip book-based e-modules have better creative thinking skills in posing math problems

One of the learning models that can be used in learning is project-based learning (PjBL). PjBL is an approach that involves students to construct knowledge and interact with peers in creating projects by developing their creativity (Amamou & Cheniti-Belcadhi, 2018). The main idea of PjBL is that real-world problems interest and provoke students' thinking when acquiring and applying new knowledge in a problem-solving context (Efstrati, 2014, Lasauskiene & Rauduvaite, 2015). PjBL helps students develop the skills of working in groups and managing their time well. Because evaluation is based on projects and class presentations, rather than rubrics, essays, and written reports, assessment is more meaningful and students develop more flexibility (Kean & Kwe, 2014) . PjBL is one of the teaching methods that fit the constructiveness learning approach, which can be done through group or individual work (Ayaz & Söylemez, 2015) .Project-based learning and evaluation methods allow for measuring learning success beyond mere theoretical understanding, emphasizing practical implementation (Vahlia & Sholiha, 2023). PjBl is a learning model to develop knowledge and creativity through problem solving based on real problems that are carried out individually or in groups in the form of projects that can be presented

In this study, PjBl was developed in the form of e-modules through the flipbook maker application so that students are easier to learn independently and can develop mathematical communication. Students also make projects in the form of product development innovations. which can be implemented for student learning. The steps of PjBL learning include (1) determining basic questions; (2) making project designs; (3) compiling scheduling; (4) monitoring project progress; (5) assessing results; (6) evaluating experiences (Yulianto, et al 2017). The project-based learning model has five stages, namely: 1) planning, conducting problem finding activities, 2) designing; sketching, determining data analysis and developing prototypes 3) implementation; making and testing sketches, evaluating, revising results and clarifying results, 4) reporting; by compiling a report on the results of the investigation and 5) evaluation: process and results (Syarifah et al, 2021).

The PjBL steps in this study include: (1) determining the problem; (2) creating a project design; (3) compiling the project; (4) monitoring project progress; (5) assessing the results; (6) evaluating the experience. The steps of PjBL in this study

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have differences with previous research, namely in previous studies, PjBL began with determining questions or making plans. While in this study it starts with determining the problem. In the process of making projects, previous research only made project designs while in this study it starts from making designs and compiling projects.

Based on the description above, research will be conducted on the design of project-based learning e-module development in mathematics learning digital technology courses. The purpose of this research is to conduct need analysis and design the development of e-modules based on project-based learning.

Research Methods

The subjects of this study were students who took the Digital Technology of Mathematics Learning course, in the Master of Mathematics Education program at Muhammadiyah Metro University, totaling 10 students. The research method is qualitative, namely describing the development process according to ADDIE (analyze, design, development, implementation and evaluation) (Branch, 2009). In this study, only the analysis (need analysis) and design (design) stages in the process of developing e-modules based on project-based learning. The need analysis stage is carried out through filling out an open questionnaire filled out by students and interviews with students and lecturers, with indicators; learning outcomes obtained, the form of teaching materials/modules used, the learning model used, the connection of the material with everyday life/products, the choice of other learning models. At the design stage, designing e-modules includes: module cover, module table of contents, content/material and tasks based on project-based learning, then converted in the form of flip-book maker. Data acquisition was analyzed in descriptive form on the results of need analysis (based on the results of questionnaires and interviews) and described the results of the design of project-based learning-based e-module development, through pictures and qualitative descriptions.

Results and Discussions

This research was conducted on Master of Mathematics Education students who took the Mathematics Learning Digital Technology course. The research is in the form of developing e-modules with the Flipbook Maker application based on Project Based Learning. The development stages include: Analysis, Design, Develope, Implementation and Evaluation. In this study, research was carried out at the initial stage of development, namely analysis and design

The analysis stage was conducted before designing the e-module through need analysis. Need analysis was conducted through interviews and questionnaire filling by lecturers and students. The results of the need analysis can be presented below:

a. Interview

From the interviews with lecturers and students, it was found that: 1) Digital technology teaching materials for learning mathematics still have some limitations, namely in the form of simple modules, which are distributed to students, 2) The modules used have not been related to everyday life in

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mathematics. 3) The module is not yet communicative, 4) The learning model uses the provision of exercises and students present in front of the class. There are tasks in the form of projects but more discussing lecture material, it is still rare for students to make learning projects. 5) The need to give assignments in the form of projects so that they find answers to questions independently, 6) The need for assignments accompanied by e-modules so that they become directions in making projects. Table 1. Recapitulation of the results of the need analysis questionnaire in the development of e-modules based on Project Based Learning

b. Questionnaire

Questionnaires were given to students about the implementation of digital technology learning in mathematics learning. The questionnaire results are presented in the following Table 1:

Table 1. Questionnaire results on the implementation of digital technology learning in mathematics learning

Subject Number	Questionnaire Number				
	1	**2**	**3**	**4**	**5**
1	Learning outcomes are quite good	Using modules, but tasks are not yet related to daily work	Practice and Project-based Learning. With project-based learning, it is easier for students to understand	Only some teaching materials are related to daily life	The need for project-based teaching materials related to everyday life.
2	Learning outcomes are quite good	Using e-modules is only part of the material	Using the task learning model	Teaching materials are in the form of assignments and not many are related to everyday life.	The need for a learning model where students make products to be used in learning, so that the material is easier to understand.
3	Good learning outcomes	Module sent via mobile phone	Some use project-based learning model	The teaching materials used are still little related to everyday life, containing digital technology	The need for a learning model to make learning products related to everyday life
4	Very good learning outcomes	Use simple modules and share with students	With project-based learning, students can try to find answers to questions independently.	Teaching materials in the form of assignments	The need to collaborate with other learning models.
5	Good learning outcomes	Still using modules but not yet in the form of e-modules	More With project-based learning, it is easier for students to understand	Only some teaching materials are related to daily life	The need for teaching materials related to daily life in the form of projects
6	Learning	Using	Using group task	Teaching materials	The need for a

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	outcomes are quite good	modules but only a few use e-modules	learning model	are in the form of assignments and not many are related to everyday life.	learning model that makes products
7	Good learning outcomes	Module sent through SPADA (Learning managemant system)	Using a task-based learning model, partly project-based learning	The teaching materials used are still little related to everyday life, containing digital technology	The need for a project-based learning model related to daily life
8	Learning outcomes are good enough	Using modules sent via WhatsAp and SPADA	With project-based learning, students can apply it in their daily life.	Teaching materials in the form of assignments	The need for varied and project-based learning models
9	Good learning outcomes	Module sent through SPADA	Using an exercise method, we recommend using project-based learning	Teaching materials have not yet produced a product, presenting the material	The need for a learning model that produces products in the form of projects
10	Learning outcomes are quite good	Module sent through SPADA	Using the assignment method	Teaching materials are not yet in the form of projects	The need for project-based teaching materials

Based on the results of student responses to the need analysis in Table 1, it can be concluded that: 1) Learning outcomes are quite good 50%, good 30% and very good 20%, 2) Teaching materials have not been through e-modules, still in the form of simple teaching materials distributed to students via cellphones 3) The learning model that is more widely used is assignments, sometimes also projects that make it easier for students to learn and students can find answers to questions independently, 4) The modules used have not been related to everyday life, some are in the form of assignments. and 5) The need for project-based teaching materials related to everyday life and collaboration with other learning models.

The results of interviews conducted with teachers obtained information that: Students in doing assignments are still limited to what is stated in the assignment/exercise, still lacking in developing innovation. For example, when given an assignment on the application of e-learning applications, they have not made or applied e-learning applications in their learning, but only made e-learning learning steps. The teaching materials used are still simple modules distributed to students. From the results of interviews with students who have mostly worked, they stated that: 1) Limited lecture time due to work should be done by hybrid learning, 2) For independent learning online, a module that can be studied independently should be made, 3) In the e-module project, it is necessary to explain the steps of project-based learning so that students understand better.

Based on the results of the questionnaire and interviews, it was found that: the modules used at this time are still simple, the tasks are still exercises that present material about digital technology, not yet in the form of projects that produce products The modules used should be those that can be used independently and in online learning, namely in the form of e-modules. The

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learning model needs to use hybrid learning due to the limited time of students while working, but students can learn and understand the material through e-modules based on Project Based Learning. Students can choose projects that will be made according to their needs and relate them to everyday problems. For example, because many students work as teachers, the projects made can be used for teaching materials and applied in the workplace.

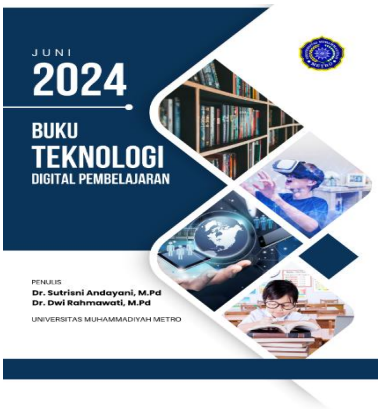
Based on the results of the need analysis above, it is necessary to develop the module. The development design is carried out by compiling a more complete module in the form of an e-module. The e-module developed is expected to make it easier for students to use it, namely in the form of a flip-book maker. In addition, in the e-module, students are expected to be able to make projects based on project-based learning. The design for the e-module contains:

1) Develop module outline and material map

The steps taken at this stage are compiling the module framework and compiling the material. In the material, exercises/tasks are given in the form of projects through the project-based learning model, namely: (1) determining the problem; (2) creating a project design; (3) compiling the project; (4) monitoring the progress of the project; (5) assessing the results; (6) evaluating the experience. The framework of the module starts from: 1) Module cover. 2) Instructions for using the module, 3) Concept Map, 4) Learning outcomes and objectives, 5) Materials. The material contains learning materials and assignments using project-based learning, which include: 1) Digital Technology in Learning, 2) Strategies and Prospects for Digital Technology in Education, 3) Digital Technology Management in Education, 4) Digital Technology Applications for 21st Century Learning and Digital Literacy, 5) Challenges and Impacts of Technology in Learning and 6) Development of Digital Technology-Based Learning Applications.

2) Transferring the module into flipbook maker, with steps: 1) Prepare the module in pdf form, 2) Register online on the flip book maker page (fliphtml5.com/login.php?register), 3) Verify registration via registered email, 4) Upload the module in pdf form into fliphtml.com waiting for the verification process, 5) Share the converted module in the form of a flip book maker via URL, link or QR Code.

The module design results are presented in the following Figure 1:



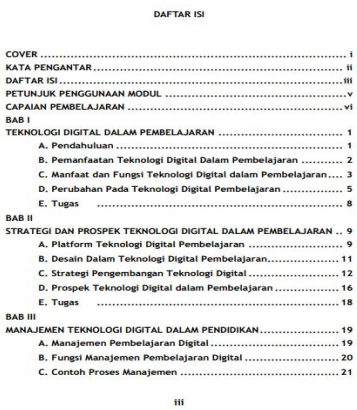


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Figure 1: Cover and Table of Contents

The cover is made using Canva, containing the title of the book, year, name and affiliation of the author. The table of contents contains the cover, preface, table of contents, instructions for using the module, learning outcomes, material from chapter 1 to chapter 6, project-based learning tasks, bibliography and appendices.

Figure 2 below shows the display of module materials that illustrate the contents of the module. After the module is converted to an e-module using the flipbook maker application, the module can already be used. Students can use it in the form of an e-module that can be viewed via android or labtob/computer.

Figure 2: Material display on the module

The findings in the need analysis research are the importance of e-modules with the flipbook maker application based on project-based learning. The results of the need analysis obtained that the modules used at this time are still simple, the tasks are still exercises that present material about digital technology not yet in the form of projects that produce products. Therefore, it is necessary to develop a Project Based Learning-based e-module that can be used independently and can be used in hybrid learning. so that students can choose the project to be made according to The results of the needs analysis (Suryana & Hidayati, 2020) show that there is a need to replace the old learning model with a new learning model, namely Cooperative Project Based Learning, which is indicated by low scores below 60% on problem solving competencies and student creativity The needs analysis of PjBL-based e-modules identifies the obstacles faced by students and the need for e-modules to support the learning process (Rahimah et al., 2022). Difinubun et al. (2022) stated that: through the needs analysis students have difficulty in understanding statistical material which discusses many story problems related to real problems in life. Thus the need to develop a module based on Project Based Learning to improve communication skills and understanding of the material.

The next finding in this study is the design process of developing an e-module flipbook maker based on Project Based Learning through the preparation of a module framework including: cover, instructions for using the module,

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concept map, learning outcomes and objectives, project-based learning-based materials and tasks, project-based materials and tasks related to the daily tasks of students as teachers, namely by making media innovations and digital technology-based mathematics teaching materials. The results of this study are relevant to the research of Ekawati et al. (2022) which states that a good e-module design includes various important elements, such as cover, table of contents, and a clear learning structure, which can facilitate the student learning process. E-modules designed with a Project Based Learning (PjBL) approach, which allows students to learn through real projects, so as to increase their independence and learning outcomes (Karimah & Churiyah, 2021) . Flipbook-based e-modules can be a very useful tool in mathematics education, especially in the context of project-based learning, where students can be actively involved in their learning process (Novitasari & Tiara, 2022) . PjBL-based e-modules not only improve student learning outcomes, but also facilitate the development of collaboration, creativity, and problem-solving skills that are critical in 21st century education (Hamidah & Citra, 2021; Saenab et al., 2019) . The project-based learning model encourages students to produce projects that can improve their skills in interactive multimedia creation (Dwi, 2023) .

The implications of e-modules using project-based learning can also be used for independent learning in online learning/hybryd learning, making it easier for students to learn anywhere and anytime via computer/handphone. The combination of these two elements can increase the effectiveness of learning, especially in subjects that require in-depth understanding of concepts, such as digital simulation in vocational schools (Karnando et al., 2021). PjBL-based e-modules are not only helpful in delivering materials, but also in building the 21st century skills needed by students (Lumbu, 2023).

The advantages of this research are: 1) e-modules based on Project Based Learning can be used independently offline and online via mobile phones/computers and hybrid learning through LMS (SPADA). Safitri et al., (2021), stated that e-modules based on Project Based Learning and according to Hasibuan et al. (2023) this e-module can be accessed online because the digital format can be used in a way that does not require a physical printout (and offline, so that students can learn without depending on an internet connection). 2) Students can create projects based on project-based learning-based assignments, and utilize the results of their projects for learning at school, thus increasing student involvement. According to Mumpuni, (2023) project-based e-modules can increase student and teacher interaction, and make learning materials more interesting and easy to understand.

The shortcomings of this study are 1) e-modules can be studied independently, so there is a concern about uneven understanding of the material (the quality of non-standardized material can result in uneven understanding among students (Billah & Masikhah, 2022), 2) lack of access to technology can hinder learning (limited access to technology by students and technical problems in using applications, (Sarwandi, 2019). 3) burdened with too many tasks (students feel burdened with tasks that are too complex if not supported by adequate guidance, (Oktaviana et al. 2019) and 4) still at the analysis and design stages of the ADDIE development steps (not yet at the develope and

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implementation stages). Therefore, it is necessary to conduct expert validation, practicality and effectiveness tests through further research.

Conclusions and Suggestions

Based on the results of the needs analysis obtained that: the need for development in the form of e-modules using the flippbook maker application based on Project Based Learning. The e-module design was prepared through a good analysis, containing module cover, instructions for using the module, learning outcomes/objectives, material and tasks in the form of projects using Project Based Learning steps, namely: (1) determine the problem; (2) create a project design; (3) compile the project; (4) monitor the progress of the project; (5) assess the results; (6) evaluate the experience. Furthermore, the module is converted using the flipbook maker application so that it can be used by students.

Suggestions in this study should be 1) in developing teaching materials carried out through need analysis to improve teaching materials, 2) Need analysis is carried out through discussions with lecturers and students, 3) In the preparation of e-modules based on Project Based Learning, it is designed for further validation.

References

Peraturan Menteri Pendidikan. (2020), Peraturan Menteri Pendidikan dan Kebudayaan nomor 3 tahun 2020 tentang Standar Nasional Pendidikan Tinggi

Amalina, I., Amirudin, M., & Siswono, T. (2019). Kemampuan Berpikir Kreatif Siswa Dalam Pengajuan Masalah Matematika Semi-Terstruktur. *Jurnal Riset Pendidikan Dan Inovasi Pembelajaran Matematika (JRPIPM),* 2(1), 40-49 https://doi.org/10.26740/jrpipm.v2n1.p040-049

Amamou, S., & Cheniti-Belcadhi, L. (2018). Tutoring In Project-Based Learning. (22nd International Conference On Knowledge-Based And Intelligent Information & Engineering Systems). *Procedia Computer Science*, 176-185. https://doi.org/10.1016/j.procs.2018.07.221

Aprianis, Novalia, Anum, A & Darmawan. (2022). Pelatihan Pembuatan Media Pembelajaran Berbantuan Aplikasi Flipbook Bagi Guru SMAN 2 Negeri Katon. *Dikmas Jurnal Pendidikan Masyarakat dan Pengabdian*, 2(1), 127-136. https://doi.org/10.37905/dikmas.2.1.127-136.2022

Aufa, M. N., Nor, M., Fitri, M. A., Iriani, R, Saadi, P., Hasbie. & Yunita, A. (2020) Module Development With Problem Based Learning (PBL) Model Based On Environmental Wetland To Increase Students' Learning Outcomes. *JKPK (Jurnal Kimia dan Pendidikan Kimia),* 5(2), 201-210. https://doi.org/10.20961/jkpk.v5i2.40451

Ayaz, M.F. & Söylemez, M. (2015), The Effect of the Project-Based Learning Approach on the Academic Achievements of the Students in Science Classes in Turkey. *A Meta Analysis Study*, *Education and Science*, 40 (178), 255-283. https://doi.org/10.15390/EB.2015.4000

Billah, M. & Maslikhah (2022)Pengembangan E-Modul Berbasis Kontekstual Menggunakan Aplikasi Flipbook Maker Pada Subtema Lingkungan Sekolahku.

Edukasia: Jurnal Pendidikan dan Pembelajaran, 3(3), 565-570 DOI: https://doi.org/10.62775/edukasia.v3i3.163

Branch, R. M. 2009. *Instructional Design: The ADDIE Approach*. London:Springe. https://doi.org/10.1007/978-0-387-09506-6

Diantari, Damayanthi, Sugihartini, & Wirawan. (2018). Pengembangan E-modul berbasis Mastery Learning untuk Mata Pelajaran KKPI Kelas XI. *Jurnal Nasional Pendidikan Teknik Informatika (Janapati)*, 7(1), 33–48. https://doi.org/10.23887/janapati.v7i1.12166

Difinubun, F.A., Makmur & Hidajat, F.A. *2022* Analisis Kebutuhan Modul Ajar Matematika Untuk Meningkatkan Kemampuan Pemecahan Masalah Siswa SMK Kelas X. *Griya Journal of Mathematics Education and Application* 2(4), 853-861. https://doi.org/10.29303/griya.v2i4.244

Dwi, M. A., Salam, U., & Warneri, W. (2023). Pengembangan e-Modul Berbasis Pjbl Dalam Pembuatan Multimedia Interaktif. *Academy of Education Journal*, 14(2), 714-726. https://doi.org/10.47200/aoej.v14i2.1885

Efstrati, D. (2014) Experiential Education Through Project Based Learning.*ERPA Congres 2014, Procedia, Social and Behavioral Sciences,* 152(2014), 1256 – 1260. https://doi.org/10.1016/j.sbspro.2014.09.362

Ekawati, N.E (2022) Peningkatan Pemahaman Konsep IPA dengan Menggunakan E-Modul Berbasis Flipbook pada Materi Usaha dan Pesawat Sederhana Kelas VIII MTs Negeri 2 Kota Magelang. *Navigation Physics*, *Journal of Physics Educatio*n, 4(1), 18-22, https://doi.org/10.30998/npjpe.v4i1.1044

Hamidah, I. and Citra, S. Y. (2021). Efektivitas Model Pembelajaran Project Based Learning (Pjbl) Terhadap Minat dan Hasil Belajar Siswa. *BIOEDUSAINS:Jurnal Pendidikan Biologi dan Sains*, 4(2), 307-314. https://doi.org/10.31539/bioedusains.v4i2.2870

Hasibuan, S., Zulfarina, Z., & Putra, R. (2023). Pengembangan e-Modul Interaktif Berbasis Kvisoft Flipbook Dengan Model Discoery Learing Pada Materi Arthropoda. *Saintifika*, 24(2), 109-121. https://doi.org/10.25037/saintifika.v24i2.135

Husnah, P. (2023). Pengembangan E-Modul Berbasis Flipbook Muatan Matematika Materi Pecahan dan Pengubahan Bentuk Pecahan di Kelas IV SD. *Invention Journal Research and Education Studies*, 4(3), 17-23. https://doi.org/10.51178/invention.v4i3.1631

Istikomah, Purwoko, R. Y., & Nugraheni, P. (2020). Pengembangan E-Modul Matematika Berbasis Realistik Untuk Meningkatkan Kemampuan. *Jurnal Ilmiah Pendidikan Matematika*, 7(2), 63–71.

Karimah, S. and Churiyah, M. (2021). Meningkatkan Kemandirian Dan Hasil Belajar Peserta Didik Menggunakan Kvisoft Flipbook Maker Berbasis Android. *Jurnal Ekonomi Bisnis Dan Pendidikan*, 1(6), 538-545. https://doi.org/10.17977/um066v1i62021p538-545

Karnando, J., Rezki, I. K., & Tasrif, E. (2021). Efektivitas E-Modul Berbasis Project Based Learning Selama Pembelajaran Jarak Jauh. *JAVIT : Jurnal Vokasi Informatika*, 1(1), 1-5. https://doi.org/10.24036/javit.v1i1.17

Kean, A.C. & & Kwe, N.M. (2014). Meaningful Learning in the Teaching of Culture: The Project Based Learning Approach, *Journal of Education and Training Studies,* 2(2), 189-197. https://doi.org/10.11114/jets.v2i2.270

e-ISSN 2746-5594
p-ISSN 2746-5608

Kholisho, Y.N. (2017) . engembangan Modul Pembelajaran Multimedia Untuk Meningkatkan Minat Dan Pemahaman Konsep Mahasiswa Prodi Pendidikan Informatika. *EDUMATIC: Jurnal Pendidikan Informatika* 1(1),17-23. https://doi.org/10.29408/edumatic.v1i1.733

Krisnanti, D. A., Rizki, S., & Vahlia, I. (2020). Pengembangan Modul Matematika Berbasis Discovery Learning Disertai Nilai-Nilai Islam Materi Pertidaksamaan Rasional dan Irasional. *EMTEKA: Jurnal Pendidikan Matematika*, 1(1), 1-10. https://doi.org/10.24127/emteka.v1i1.373

Lasauskiene, J. & Rauduvaite, A. (2015), Project-Based Learning at University: Teaching Experiences of Lecturers, 7th World Conference on Educational Sciences, (WCES-2015), 05-07 February Novotel Athens Convention Center Athens. *Greece Procedia Computer Science,* 176–185

Lumbu, A. and Kurniawan, V. D. P. (2023). Development Of Pjbl Stem-Based Physics e-Modules In Improving Generic Science Skills Of Class x IPA Students In The Material Of Vector Analysis In Parabola Motion. *Jurnal Ilmu Pendidikan Indonesia,* 11(2), 68-80. https://doi.org/10.31957/jipi.v11i2.3075

Mumpuni, R. (2023). Pengembangan e-Modul Berbasis Problem Based Learning Menggunakan Kvisoft Flipbook Maker. *Edumatica. Jurnal Pendidikan Matematika*, 13(03), 285-294. https://doi.org/10.22437/edumatica.v13i03.28634

Oktaviana, N.V., Nayazik & Rani, H.A.D. (2019), Efektifitas Efektivitas Penerapan E-Modul Berbasis Kvisoft Flipbook Maker Materi Satuan Panjang Kelas 3 SD. *Joined Journal: Journal of Informatics Educations*, 2(1), 32-40, DOI: https://doi.org/10.31331/joined.v2i1.839

Putri, H.E. dan Usmeldi, (2020). The Development Of E-Modules Problem Based Learning Using Google Classroom For Basic Electricity And Electronics At Vocational School Cyberspace. *Jurnal Pendidikan Teknologi Informasi*, 4(2), 84-93. https://doi.org/10.22373/cj.v4i2.7861

Rahimah, Yuliani, H. & Syar, N.I. (2022), Analisis Kebutuhan E-Module Berbasis Project Based Learning pada Materi Pokok Gelombang Bunyi Kelas XI SMA. *Silampari Jurnal Pendidikan Ilmu Fisika (SJPIF)*, 4(2), 75-86, DOI: https://doi.org/10.31540/sjpif.v4i2.1570

Saenab, S., Yunus, S. R., & Husain, H. (2019). Pengaruh Penggunaan Model Project Based Learning Terhadap Keterampilan Kolaborasi Mahasiswa Pendidikan Ipa. *Biosel: Biology Science And Education,* 8(1), 29-41. https://doi.org/10.33477/bs.v8i1.844

Safitri, S., Churiyah, M., Arief, M., & Zen, F. (2021). Pengembangan e-Modul Berdasarkan Aplikasi Pdf Flipbook Untuk Meningkatkan Kemampuan Menulis Dan Kemampuan Belajar Mandiri Peserta Didik (e-Module Based On The Corporate Pdf Flipbook Application Which Is Useful In The Covid-19 Era). *Jurnal Ekonomi Bisnis dan Pendidikan*, 1(6), 589-599. https://doi.org/10.17977/um066v1i62021p589-599

Sarwandi, Giatman, Sukardi & Irfan, D. (2019***).*** Developing Mobile-Based Project-Based Learning Module For Project Management Courses In Vocational *Education Jurnal Pendidikan Vokasi*, 9(2), 207-216. https://doi.org/10.21831/jpv.v9i2.25947

e-ISSN 2746-5594
p-ISSN 2746-5608

Suryana, F. & Hidayati, A.(2020), Needs Analysis of the Development Cooperative Project-Based Learning Models in the Digital Age, *JVEIT (Journal of Vocational Education and Information Tachnology, 1(1),* 13-19. https://doi.org/10.56667/jveit.v1i1.30

Syafri, F. S. (2018). *Pengembangan Modul Pembelajaran Aljabar Elementer Diprogram Studi Tadris Matematika IAIN Bengkulu*. Bengkulu: Zigie Utama.

Syarifah, L., Holisin, I. & Shoffa, S. (2021). Meta Analisis: Model Pembelajaran Project Based Learning. *Jurnal Penelitian Pembelajaran Matematika* 14(2), 256-272.

Taqwina, A. Rahmiati, R., & Rosalina, L. (2023). Flipbook Maker Based e-Module In Hand, Foot And Nail Care Courses. *Journal For Lesson And Learning Studies*, 5(3), 385-392. https://doi.org/10.23887/jlls.v5i3.57188

Triwahyuningtyas, D., Ningtyas, A.S. & Rahayu, S. (2020). The Problem-Based Learning E-Module Of Planes Using Kvisoft Flipbook Maker For Elementary School Students. *Jurnal Prima Edukasia*, 8(2), 199-208, https://doi.org/10.21831/jpe.v8i2.34446.

Vahlia, I., & Sholiha, S. (2023). Pengembangan Authentic Assessment Berbasis Proyek Pada Mata Kuliah Kewirausahaan. PROMOSI: *Jurnal Program Studi Pendidikan Ekonomi (e-Journal)*, 11(1), 115-121. https://doi.org/10.24127/pro.v11i1.7890

Widjayanti, W.Z., Masfingatin, T. & Setyansah, R.K. (2018). Media Pembelajaran Interaktif Berbasis Animasi pada Materi Statistika untuk Siswa Kelas 7 SMP. *Jurnal Pendidikan Matematika,* 13(1):101-112, doi:10.22342/jpm.13.1.6294.101-112.

Yani, R., Anwar, R. B., & Vahlia, I. (2022). Pengembangan Modul Matematika Berbasis Pendekatan Kontesktual Disertai Qr Code Pada Materi Logaritma. *Jurnal Pendidikan Matematika (EMTEKA)*, 11(1), 224-234.https://doi.org/10.24127/ajpm.v11i1.4703

Yulianto, Fatchan A. & Astina, I.K. (2017). Penerapan Model Pembelajaran Project Based Learning Berbasis Lesson Study Untuk Meningkatkan Keaktifan Belajar Siswa. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 2(3), 448—453

Zhafirah, T., Erna, M., & Rery, R. (2020). Development Of e-Module Based On Problem Based Learning (Pbl) In Hydrocarbon Material. *Al-Ishlah Jurnal Pendidikan*, 12(2), 216-229. https://doi.org/10.35445/alishlah.v12i2.263