JPPIPA 10(11) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of Project Based Learning E-Modules in Chemistry Learning Design Course Using Flipbook Builder Application

Wilda Syahri[1*], Fuldiaratman[1], Firdiawan Ekaputra[1]

[1] Chemistry Education, Universitas Jambi, Jambi, Indonesia.

Received: July 31, 2024
Revised: September 10, 2024
Accepted: November 25, 2024
Published: November 30, 2024

Corresponding Author:
Wilda Syahri
wilda.syahri@unja.ac.id

DOI: 10.29303/jppipa.v10i11.8686

Abstract: The purpose of this study was to develop a project-based learning e-module in chemical learning design courses using the flipbook builder application. The method used in this research is the Research and Development method to develop project-based learning e-modules in chemical learning design courses using the flipbook builder application. The e-module media development model used in this study, namely the ADDIE model which consists of 5 stages including analysis, design, development, implementation, and evaluation. The subjects used in this study were students of the Chemistry Education Study Program at Jambi University who had taken a chemistry learning design course, namely 15 students in the small scale test and 30 students in the large scale test. Based on the feasibility test assessment of project-based learning e-modules in chemistry learning design courses that have been developed on a small scale, the score is 89.33 with very high criteria, while the large-scale feasibility test scores 91.83 with very high criteria.

Keywords: ADDIE; E-module; Project-based learning

Introduction

In the learning process, technology integration is necessary to improve the quality of learning. Technology plays an important role in providing diverse and sustainable methods (Noppakhunwong et al., 2024). The development of technology in education is expected to produce a generation that excels in knowledge, increases social awareness, and is adaptive in changing times (Kruty et al., 2023). Technology can improve student engagement, effectiveness and quality of learning experience. The advancement of digital technology has made many changes in all aspects and fundamentals (Mihelač, 2024).

Technological advances make all learning tools more practical and easier. Information exchange, especially in the field of education, has become very fast thanks to technological advances (Sungkono & Ekaputra, 2024). Technological innovations in education and interdisciplinary learning can improve competencies and change the way problems are analyzed and solutions provided (Greenburg et al., 2024). Students do not need to bring thick lecture modules to class, but are already in electronic form. Therefore, technological development can have an impact on the progress of a nation (Ekaputra & Widarwati, 2023). Technological advances in education play an important role in improving the quality of human resources (Samsi & Djukri, 2023).

Electronic modules allow students to operate them from anywhere because they can be opened from each student's laptop or device. Module is a form of teaching material used in the learning process which consists of a series of learning activities arranged to help students achieve a learning objective (Larasati et al., 2020). Electronic modules can integrate various features such as video, audio, movies, quizzes, animations (Ananda & Usmeldi, 2023). The availability of modules in electronic

How to Cite:
Syahri, W., Fuldiaratman, & Ekaputra, F. (2024). Development of Project Based Learning E-Modules in Chemistry Learning Design Course Using Flipbook Builder Application. *Jurnal Penelitian Pendidikan IPA*, *10*(11), 8311–8318. https://doi.org/10.29303/jppipa.v10i11.8686

form or e-modules can be used to support learning activities and meet skill needs in the 21st century (Endaryati et al., 2021). Digital media literacy and utilization is very important, especially in planning, solving problems, and making decisions at hand (Bajec, 2023). Learning conducted by teachers in the 21st century must be interesting and organized (Hamidi et al., 2024). The use of electronic media can make learning more practical and easier to implement (Adri & Suwarjono, 2023).

The availability of e-modules used in learning can increase attention and learning outcomes through structured learning activities and presentation of material (Yulianto et al., 2022). Learning using electronic modules can increase students' learning motivation (Samsi & Djukri, 2024). The use of e-modules in learning can have a positive impact on students' attitudes, knowledge and metacognition (Nuri et al., 2023).

Based on the results of interviews and observations conducted at Jambi University Chemistry Education Study Program students who have attended chemical learning design lectures are students' views on difficult chemical learning design courses, this is evidenced by the level of student understanding of chemical learning design courses is still low due to the breadth of lecture material. One of the factors that cause the low level of student understanding of chemical learning design lecture material is the availability of e-modules that have not been maximally developed. The limited media and modules used in lecture activities make learning not maximally directed and learning objectives are not achieved optimally. This is in accordance with research conducted by Hendrawensi et al. (2024) which states that the application of electronic modules can make learning more effective and interesting for students. The use of technology in learning activities can increase learner participation, so that learning achievement can also increase (Jianjun et al., 2024).

The availability of lecture modules with interactive and interesting project-based learning models is very necessary so that students can learn lecture material pleasantly. The availability of media and e-modules that assist students in understanding lecture material is still limited, making it difficult for students to find references and understand lecture material. The flipbuilder application can be used to develop interesting learning modules for students. Flipbuilder applications such as Flip PDF Professional used in making flipbooks can be easily used and operated on smartphones and laptops (Syuzita et al., 2023). The use of the flipbuilder application can make the electronic module developed have the effect of a reversible book, so that it resembles a real book (Sholichin et al., 2022). The Professional PDF flip application is an application that can be used to develop flipbooks that have various interesting features, so that the process of making electronic media becomes easier (Kurniawan et al., 2024).

Flipbook is a simple learning tool that can help students understand the material being studied. Flipbook is an innovative media that can be applied in the learning process to improve critical thinking (Haryanto et al., 2024). The use of flipbooks in learning can improve student learning outcomes and increase learning activities (Yulaika et al., 2020). Flipbook-based learning media can increase student participation in learning activities and increase the level of activeness in learning (Febriyanti & Mayarni, 2022). Flipbook applications can be interesting to use if animations and images are inserted sequentially. Flipbook media that can combine video, audio, and text can also attract attention and encourage students to learn (Arisandhi et al., 2023). Interactive flipbook applications equipped with video and audio can also increase student motivation to learn (Dewi & Ayu, 2022). The advantages of electronic modules in the form of flipbooks are that they have flexibility in operation because they can be used anytime and anywhere, and are more attractive because they can include text, images, and videos (Waliulu & Palembang, 2022). The operation of flipbook media is considered easy and practical because it can be done online or offline (Amaliyah et al., 2023). Flipbooks make it easy to explain material macroscopically and microscopically (Syahri & Yusnaidar, 2022).

The potential in developing an electronic learning module integrated with an interactive project-based learning (PjBL) model is still large to make learning in chemistry learning design courses more interesting. The application of the project-based learning model is one of the efforts to improve student skills in facing the demands of the times that contain 4C skills. 4C skills are a series of skills consisting of critical thinking skills, creativity, communication skills, and collaboration skills (Ekaputra, 2023). Increasing the competence of students can be done by providing 4C skills (Hendra et al., 2023). Creativity needs to be possessed from an early age as a provision in facing the rapidly changing times (Sungkono & Ekaputra, 2024). Therefore, the role of teachers in providing supplies and creating a pleasant learning atmosphere is very important. Teachers can make the learning atmosphere fun and active for students (Haryanto et al., 2023).

The flipbook builder application which has not been optimally utilized to be used as a basic application for electronic module developers, so that the flipbook builder application can be used as an alternative in developing e-module in the form of flipbooks. The use of digital media such as flipbook applications in learning can indirectly increase digital competencies. The often

massive use of technology in everyday life makes digital competence an important competence to have (Tomaš et al., 2024). Digital competency is an important competency to have because through this competency you can access wider knowledge (Al-Muqbil, 2024). Students become directly involved with the use of e-module integrated with the PjBL model in lecture activities which are presented systematically and measurable with the e-modules expected to be more active. The use of technology-based media can make learning more active (Ekaputra, 2020). The activity of developing e-modules for lectures based on the PjBL model is expected to increase student understanding of chemical learning design lecture material and the potential of students can be developed. Therefore, the purpose of this research is to develop project-based learning e-modules in chemical learning design courses using the flipbook builder application.

Method

The method used in this research is the Research and Development method to develop project-based learning e-module in chemistry learning design courses using the flipbook builder application. The e-module media development model used in this study, namely the ADDIE model which consists of 5 stages including analysis, design, development, implementation, and evaluation. The subjects used in this study were students of the Chemistry Education Study Program at Jambi University who had taken a chemistry learning design course, namely 15 students in the small scale test and 30 students in the large scale test. The instruments used in this study were validation sheets for media experts and material experts, project-based learning e-module media feasibility sheets in chemical learning design courses using the flipbook builder application in small and large scale tests.

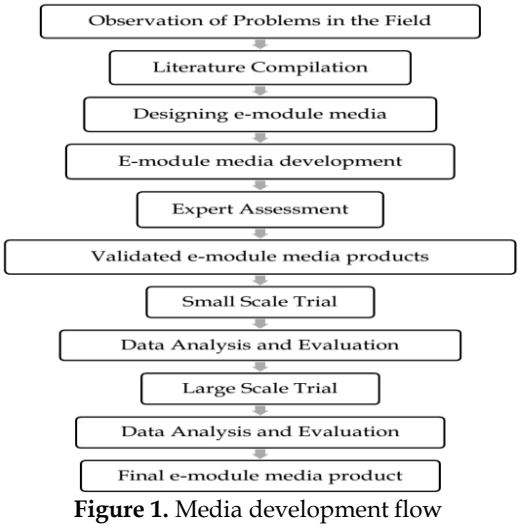

Figure 1. Media development flow

The data collection technique used in this research is a questionnaire to assess the feasibility of project-based learning e-module media in chemical learning design courses using the flipbook builder application developed. The data analysis techniques used in this research are qualitative and quantitative. Qualitative and quantitative data are obtained from validation and input by experts who aim to determine the feasibility of project-based learning e-modules in chemistry learning design courses using the flipbook builder application. Quantitative data is obtained from product feasibility tests consisting of small and large scale trials. The small-scale product feasibility test was conducted on 15 students who had taken the chemical learning design course and a large-scale trial on 30 students. The product feasibility test was conducted to assess the quality and feasibility of project-based learning e-module media in chemical learning design courses using the flipbook builder application. The results of the project-based learning e-module media assessment in chemical learning design courses using the flipbook builder application are then averaged on a scale of 100 to determine the quality of the media, which is presented in Table 1.

Table 1. Media Assessment Criteria

Score Range	Criteria
81 -100	Very High
61 – 80	High
41 – 60	Medium
21 – 40	Low
0 – 20	Very Low

Result and Discussion

The media development model for project-based learning e-modules in chemistry learning design courses used in this study, namely the ADDIE model which consists of 5 stages including analysis, design, development, implementation, and evaluation, which are described as follows:

Analysis. The analysis stage is a stage to find out and analyze the needs and problems in the field, analysis of student learning styles and interests through interviews with lecturers and students, collecting literacy about learning modules, project-based learning models, flipbooks, and biulder flipbook applications, RPS chemical learning design. The results of the analysis of observations in the field show that there are problems in the chemical learning design course, namely students' views on the difficult chemical learning design course, the level of student understanding of the chemical learning design course is still low due to the breadth of lecture material, the availability of media that helps students understand lecture material is still limited,

learning e-module has not been developed optimally, the flipbook builder application has not been used as an alternative in developing e-module. The existence of technology in education can make students' understanding of the subject matter increase (Birney & McNamara, 2024).

Students have difficulty in controlling focus during activities, students are less actively involved in lecture activities, electronic-based learning media that are integrated with project-based learning models have not been developed and applied optimally, so students feel bored with the learning that is done. Lecturers teaching chemical learning design courses feel the need for innovation and variety in lecture activities carried out, so that students can be interested and actively involved in participating in lecture activities. Active learning can be caused by direct involvement in learning, responsibility, and motivation (Nazim et al., 2024). Based on the analysis of the problems in the field, researchers try to provide a solution, namely developing project-based learning e-modules in chemical learning design courses, so that it is hoped that the media can overcome the problems in the field, especially in chemical learning design lectures. The analysis stage is also carried out on supporting technology such as the advantages of flipbooks and how to use the flipbuilder application. The next stage is goal analysis which aims to find out lecture material, learning outcomes and learning objectives. Analysis of objectives is used as a basic reference in compiling a storyboard of project-based learning e-modules in chemical learning design courses.

Design. This design stage aims to design solutions from the results of the analysis in the field, such as the media and learning models that will be used. The design stage is the basis of the media developed in this study as a solution to the problems encountered in the field. The initial step taken at the design stage is to determine media experts, material experts, 15 students in the small-scale test, and 30 students in the large-scale test. After determining the validator, then determining the research schedule and preparation of material on project-based learning e-modules in chemistry learning design courses, media specifications, making flowcharts as a reference in developing project-based learning e-module in chemical learning design courses, and making storyboards.

Development. The development stage aims to produce a project-based learning e-module media in chemical learning design courses that has been revised by considering suggestions and responses from media experts and material experts. At this stage, project-based learning e-modules in chemical learning design courses are developed based on the previously designed storyboard design using various necessary development tools. The preparation of e-module products is carried out using the Canva application for the editing process and combining various elements that have been collected previously such as images, text, tables and other supporting animations. After the e-module has been developed with the canva application, a format change is made using the flipbuilder application, so that students can access the e-module through the link provided. The results of the development of project-based learning e-modules in chemistry learning design courses are presented in Figure 2.

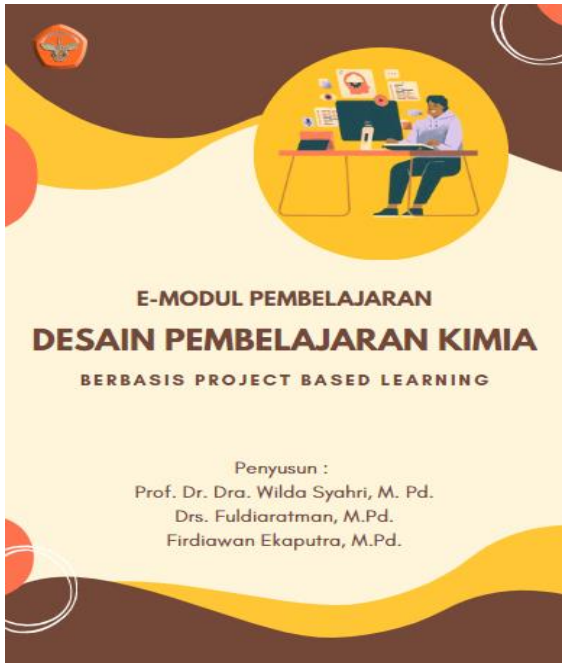

Figure 2. Cover page of e-module

Implementation. E-module based on project-based learning in chemistry learning design courses that have been developed are tested by expert validators. The validator will provide an assessment, suggestions regarding the product using a validity instrument sheet that has been developed and validated at the design stage. In addition to conducting product testing, the development stage also conducted data analysis and product revision to ensure that the development product is suitable and feasible for limited testing at a later stage. The revisions that have been made to the product of the e-module based on project-based learning that has been developed are as follows:

Material Expert Validation. The assessment to the material expert at the first stage was carried out on July 11, 2024 and the second stage was carried out on July 18, 2024. Based on the material expert's assessment of the e-module based on project-based learning developed on several inputs, such as adding CPMK and sub-CPMK to each material, developer profiles, and images of the

development flow in the modules made. Furthermore, improvements were made to the material presented to better assist students in understanding chemical learning design course material.

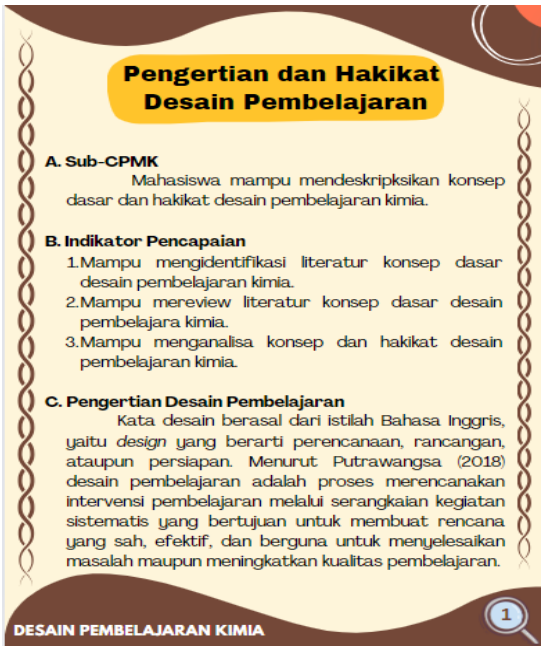

Figure 3. Module expert validation results

Media Expert Validation. The assessment to the material expert at the first stage was carried out on July 18, 2024 and the second stage was carried out on July 19, 2024. Based on the media expert's assessment of the e-module based on project-based learning developed on several inputs, such as adding instructions for using the e-module based on project-based learning, eliminating titles other than at the beginning of lecture material. Furthermore, improvements were made to the material presented to better assist students in using project-based learning-based e-modules in chemistry learning design courses. The results of project-based learning e-modules in chemistry learning design courses that have been validated by media and material experts are presented in Figure 3.

Table 2. Small Group Test Results

Statement	Value
Sharpness of background color	88.33
Consistency of lay out	88.33
Appropriateness of sentence placement with layout	88.33
Ease of typeface to read	86.67
Suitability of font size with background size	91.67
Suitability of letter color with background color	90.00
Appropriateness of image placement with the lay out	91.67
Appropriateness of image size with background size	88.33
Image color suitability with background color	90.00
Instructions for use in the media	90.00
Average	89.33

After making improvements from the input of media and material experts, and declared feasible for research at the next stage. In this study, e-module based on project-based learning assessment was conducted by students. The assessment by students was carried out in two stages, namely a small-scale assessment conducted on July 22, 2024 consisting of 15 students. Assessment of media quality by students using qualitative and quantitative questionnaires with a score range of 1-4. The results of the media feasibility test by small groups are presented in Table 2.

The results of the small group media quality feasibility test assessment showed an average value of 89.33. This shows that the quality of project-based learning e-modules in chemistry learning design courses using the flipbook builder application based on small group assessments has very high quality. The highest score is obtained in the suitability of the font size with the background size and the suitability of image placement with the lay out with a value of 91.67. Students who are samples in small groups feel that the images contained in the lay out make it easier to understand the material, and the font size is appropriate so that it is easy to read. After the small group assessment, the large group media quality feasibility test was then carried out. The large group feasibility test was conducted on 30 students of the Chemistry Education Study Program on July 23, 2024. The results of the media feasibility test by the large group are presented in Table 3.

Table 3. Large Group Test Results

Statement	Value
Sharpness of background color	93.33
Consistency of lay out	91.67
Appropriateness of sentence placement with layout	90.00
Ease of typeface to read	90.00
Suitability of font size with background size	93.33
Suitability of letter color with background color	90.00
Appropriateness of image placement with the lay out	93.33
Appropriateness of image size with background size	95.00
Image color suitability with background color	91.67
Instructions for use in the media	90.00
Average	91.83

The results of the large group media quality feasibility test assessment showed an average value of 91.83. This shows that the quality of project-based learning e-modules in chemical learning design courses using the flipbook builder application based on large group assessments has very high quality. The value obtained in the large-scale test is at least 90, this can be caused that students feel comfortable in using e-modules in learning chemical learning design lecture material. The development of e-modules based on

project-based learning can make learning practical in learning the material, so that learning outcomes will increase (Antari et al., 2023).

Evaluation. Based on the validation results that have been carried out by media expert validators and material experts, it is stated that the e-module that has been developed has been declared good and feasible to be tested on a small scale. The results of the feasibility assessment of the small-scale test e-module obtained a score of 89.33 and 91.83 in the large-scale test, thus obtaining very high criteria. The e-modules that have been developed have been declared very good by students who have attended chemical learning design courses, so that the e-modules that have been developed can be field tested in further research.

Conclusion

Based on the results of research and discussion, it can be concluded that the development of project-based learning e-modules in chemistry learning design courses using the flipbook builder application with very high criteria. This is evidenced by the results of the small-scale feasibility test which obtained a score of 89.33 and the large-scale feasibility test which obtained a score of 91.83.

Acknowledgments
I would like to thank to all parties who have support this research.

Author Contributions
In this paper, the author has contributed to several parts as follows: conceptualization, W. S, F. E.; methodology, F, F. E.; formal analysis, W. S.; resources, F; data curation, F. E.; visualization, and F. E. All authors have read and agreed to the published version of the manuscript.

Funding
This research was funded by DIPA PNBP Fakultas Keguruan dan Ilmu Pendidikan Skema Penelitian Terapan Tahun Anggaran 2024.

Conflicts of Interest
All authors declare that there is no conflicts of interest.

References

Adri, H. T., & Suwarjono. (2023). Developing Science E-Modules based on Scientific reasoning Skills for Primary Education Course. *Jurnal Penelitian Pendidikan IPA*, *9*(8), 6480–6486. https://doi.org/10.29303/jppipa.v9i8.4727

Amaliyah, R. A., Amin, N., Rahma, N. K., Rahmawati, L., & Rahma, S. (2023). Workshop media pembelajaran berbasis kurikulum merdeka untuk meningkatkan Technological Knowledge (TK) Guru SDN No. 60 Lembang. *Journal of Community Engagement*, *5*(2), 94–111. https://doi.org/10.19105/pjce.v5i2.10493

Ananda, P. N., & Usmeldi, U. (2023). Validity and Practicality of E-Module Model Inquiry Based Online Learning to Improve Student Competence. *Jurnal Penelitian Pendidikan IPA*, *9*(4), 2010–2017. https://doi.org/10.29303/jppipa.v9i4.3563

Antari, P. L., Widiana, I. W., & Wibawa, I. M. C. (2023). Modul Elektronik Berbasis Project Based Learning Pembelajaran IPAS untuk Meningkatkan Hasil Belajar Siswa Sekolah Dasar. *Jurnal Imiah Pendidikan Dan Pembelajaran*, *7*(2), 266–275. https://doi.org/10.23887/jipp.v7i2.60236

Arisandhi, G. A. M. M., Wibawa, I. M. C., & Yudiana, K. (2023). Flipbook: Media Pembelajaran Interaktif Untuk Meningkatkan Kognitif IPA Siswa Sekolah Dasar. *Mimbar PGSD Undiksha*, *11*(1), 165–174. https://doi.org/10.23887/jjpgsd.v11i1.55034

Bajec, M. L. (2023). Vloga Formalnega In Neformalnega Izobraževanja Pri Razvoju Tehnološke Pismenosti; Primer Modelarskega Krožka. *Journal of Elementary Education*, *16*(3), 321–338. https://doi.org/10.18690/rei.16.3.2711

Birney, L., & McNamara, D. M. (2024). The Curriculum and Community Environmental Restoration Science (STEM + Computer Science) Project – Attaining a STEM Mindset Through Improved Technological Ability. *Journal of Curriculum and Teaching*, *13*(1), 394–404. https://doi.org/10.5430/jct.v13n1p394

Dewi, N. K. C., & Ayu, T. L. (2022). Media Pembelajaran Flipbook Interaktif Bahasa Bali Tema Lingkunganku untuk Anak Usia Dini. *Jurnal Pendidikan Anak Usia Dini Undiksha*, *10*(2), 217–227. https://doi.org/10.23887/paud.v10i2.49245

Ekaputra, F. (2020). Implementasi Pembelajaran Daring Untuk Mengingkatkan Aktivitas Belajar Kimia SMA Muhammadiyah 1 Yogyakarta. *Lenternal: Learning and Teaching Journal*, *2*(2), 19–23. https://doi.org/10.32923/lenternal.v1i2.1245

Ekaputra, F. (2023). Peningkatan Keterampilan Berpikir Kritis dan Kolaborasi Mahasiswa Melalui Model Discovery Learning. *MENDIDIK: Jurnal Kajian Pendidikan Dan Pengajaran*, *8*(1), 208–214. https://doi.org/10.30653/003.202392.57

Ekaputra, F., & Widarwati, S. (2023). Discovery Learning Based Practicum Learning in Improving Critical Thinking Skill and Student Creativity. *Tarbiyah: Jurnal Ilmiah Kependidikan*, *12*(1), 47–56. https://doi.org/10.18592/tarbiyah.9183

Endaryati, S. A., Atmojo, I. R. W., Slamet, St. Y., & Suryandari, K. C. (2021). Analisis E-Modul

Flipbook Berbasis Problem Based Learning untuk Memberdayakan Keterampilan Berpikir Kritis Pembelajaran IPA Sekolah Dasar. *Dwija Cendekia: Jurnal Riset Pedagogik*, *5*(2), 300–312. https://doi.org/10.20961/jdc.v5i2.56190

Febriyanti, E., & Mayarni. (2022). Pengaruh Strategi Pembelajaran Aktif Tipe Crossword Puzzle Berbantuan Media Flip Book Terhadap Keaktifan Belajar IPA Siswa Kelas IV Sekolah Dasar. *Jurnal Pendidikan Sains Indonesia*, *10*(4), 816–832. https://doi.org/10.24815/jpsi.v10i4.26281

Greenburg, D. S., Davis, W. J., & Singleton, E. (2024). Developing a Quantitative Methods Course for Civil and Construction Engineering Students. *Journal of Higher Education Theory and Practice*, *24*(8), 41. https://doi.org/10.33423/jhetp.v24i8.7199

Hamidi, A., Akmala, R., Suyanta, & Wilujeng, I. (2024). Development of PBL Based E-Modules to Boost Students' Science Process Skills. *Jurnal Penelitian Pendidikan IPA*, *10*(2), 820–827. https://doi.org/10.29303/jppipa.v10i2.5939

Haryanto, Ernawati, M. D. W., Fuldiaratman, Afrida, & Ekaputra, F. (2023). Implementasi Aplikasi PhET Simulation dalam Pembelajaran MIPA Berbasis Eksperimen. *I-Com: Indonesian Community Journal*, *3*(3), 1372–1379. https://doi.org/10.33379/icom.v3i3.3160

Haryanto, H., Widarti, H. R., Mashfufah, A., Dewi, R. S. I., & Kusumaningrum, S. R. (2024). Flipbook-Based Project-Based Learning: An Opportunity to Improve Science Literacy. *Jurnal Penelitian Pendidikan IPA*, *10*(1), 4004–4009. https://doi.org/10.29303/jppipa.v10i7.7916

Hendra, Candra, A. A., & Ekaputra, F. (2023). Meningkatkan Keterampilan Berpikir Kritis Mahasiswa Melalui Kegiatan Pendampingan Penulisan Gagasan Pada Artikel. *ESTUNGKARA*, *2*(1), 24–32. https://doi.org/10.22437/est.v2i1.24577

Hendrawensi, Hidayati, A., Yeni, F., & Zurwina. (2024). Development of Electronic Module (E-Module) Based on Case Method in Science Subjects at Junior High School. *Jurnal Penelitian Pendidikan IPA*, *10*(6), 3486–3492. https://doi.org/10.29303/jppipa.v10i6.6796

Jianjun, W., Hamid, Z. A., & Tan, W. H. (2024). Assessing the Impact of Multicultural Curriculum on Student Performance in Beijing High Schools. *Journal of Curriculum and Teaching*, *13*(2), 319–332. https://doi.org/10.5430/jct.v13n2p319

Kruty, K., Zdanevych, L., Pisotska, L., Desnova, I., & Molnar, T. (2023). Implementation of Innovative Educational Technologies in the Training of Specialists in Pedagogy and Psychology (European Experience). *Journal of Curriculum and Teaching*, *12*(5), 58–67. https://doi.org/10.5430/JCT.V12N5P58

Kurniawan, F., Daharnis, Zen, Z., & Erita, Y. (2024). Development of Electronic Teaching Materials Using Flip PDF Professional in Class V Elementary School. *Jurnal Penelitian Pendidikan IPA*, *10*(6), 3212–3220. https://doi.org/10.29303/jppipa.v10i6.7610

Larasati, A. D., Lepiyanto, A., Sutanto, A., & Asih, T. (2020). Pengembangan E-Modul Terintegrasi Nilai-Nilai Islam Pada Materi Sistem Respirasi. *Didaktika Biologi: Jurnal Penelitian Pendidikan Biologi*, *4*(1), 1–9. https://doi.org/10.32502/dikbio.v4i1.2766

Mihelač, L. (2024). Recommendation Systems, Parents, and Preschool Children: The Story Behind Digital Technology. *Revija Za Elementarno Izobraževanje*, *17*(2), 155–170. https://doi.org/10.18690/rei.3488

Nazim, M., Alzubi, A. A. F., & Fakih, A. H. (2024). Teachers' Awareness of Student-Centered Pedagogy and Assessment in EFL Context. *Journal of Curriculum and Teaching*, *13*(1), 13–23. https://doi.org/10.5430/jct.v13n1p13

Noppakhunwong, T., Kantathanawat, T., & Pimdee, P. (2024). Development of Learning Management Model of Collaborative Learning and Positive Coaching on Cloud Computing System. *Journal of Higher Education Theory and Practice*, *24*(8), 69. https://doi.org/10.33423/jhetp.v24i8.7201

Nuri, L. N. N., Wahyuni, S., & Ridlo, Z. R. (2023). Development of an Android-Based Mobile Learning Module to Improve the Students Critical Thinking Skills. *Jurnal Penelitian Pendidikan IPA*, *9*(7), 4991–4998. https://doi.org/10.29303/jppipa.v9i7.2944

Samsi, I. F., & Djukri. (2024). A Development of Flipped Classroom Based an Electronic Module on Circulation System Material to Increase Student' Learning Motivation. *Jurnal Penelitian Pendidikan IPA*, *10*(7), 4319–4326. https://doi.org/10.29303/jppipa.v10i7.7411

Sholichin, M., Razak, A., Lufri, L., & Irdawati, I. (2022). Validitas dan Praktikalitas E-Modul Berbasis Mobile Learning Berbantuan 3D Page Flip Professional Pada Materi Ekologi dan Perubahan Lingkungan di Kelas X SMA. *Jurnal Penelitian Pendidikan IPA*, *8*(6), 3034–3043. https://doi.org/10.29303/jppipa.v8i6.2467

Sungkono, S., & Ekaputra, F. (2024). The Application of Audio Scripts for Micro Learning Meaning and Purpose in Enhancing Students' Learning Creativity. *Daengku: Journal of Humanities and Social Sciences Innovation*, *4*(3), 397–401. https://doi.org/10.35877/454RI.daengku2529

Syahri, W., & Yusnaidar. (2022). Pengembangan E-Book Materi Gas Ideal Berbasis Multipel Representasi Menggunakan 3D Pageflip. *Journal of The Indonesian Society of Integrated Chemistry*, *14*(1), 1–9. https://doi.org/10.22437/jisic.v14i1.16506

Syuzita, A., Susilawati, S., & Sukarso, A. (2023). Validation of E-Module Based on Argument-Driven Inquiry using 3D Page Flip Professional to Improve Students' Generic Science, Critical Thinking and Scientific Argumentation Abilities. *Jurnal Penelitian Pendidikan IPA*, *9*(8), 6272–6277. https://doi.org/10.29303/jppipa.v9i8.4947

Tomaš, S., Vrdljak, M., & Jakupčević, K. K. (2024). Digital Skills Assessment And Digital Competence Self-Assessment Among Students At The University of Split. *Journal of Elementary Education*, *17*(1), 53–68. https://doi.org/10.18690/rei.3084

Waliulu, Y. S., & Palembang, C. F. (2022). Penerapan Perangkat Pembelajaran E-Modul Berbasis Flipbook. *Jurnal Pendidikan Dan Ilmu Sosial*, *2*. https://doi.org/10.47134/aksiologi.v2i2.84

Yulaika, N. F., Harti, H., & Sakti, N. C. (2020). Pengembangan Bahan Ajar Elektronik Berbasis Flip Book Untuk Meningkatkan Hasil Belajar Peserta Didik. *JPEKA: Jurnal Pendidikan Ekonomi, Manajemen Dan Keuangan*, *4*(1), 67–76. https://doi.org/10.26740/jpeka.v4n1.p67-76

Yulianto, R., Pujiati, & Maydiantoro, A. (2022). Analisis Kebutuhan Pengembangan E-modul Pembelajaran Berbasis Flipbook Maker Untuk Meningkatkan Hasil Belajar Siklus Akuntansi Perusahaan Jasa. *Economic Education and Entrepreneurship Journal*, *5*(1), 74–84. https://doi.org/10.23960/E3J/v5i1.74-84