

# Soft-ProM Digital Module based on ADDIE Model to Improve University Students' Achievement Motivation on Software Project Management Subject

Ika Safitri Windiarti<sup>1</sup>, Citra Amalia<sup>2</sup>

<sup>1,2</sup>Department of Computer Science, Faculty of Engineering and Informatics, Muhammadiyah University of Palangkaraya, Indonesia

Date of Submission: 20-04-2023

Date of Acceptance: 30-04-2023

**ABSTRACT:** This paper presents the development of digital module using the ADDIE model for improving university students' motivation on software project management subject called Soft-ProM. To create useful learning materials, instructional designers frequently use the ADDIE paradigm. Yet, the flexibility, interaction, and engagement of the conventional module using ADDIE approach are constrained. To address these challenges and boost student motivation, a digital module based on ADDIE model was created. The Soft-ProM digital module consists of several components, including interactive multimedia materials, self-assessment tools, and social learning features. These components are designed to promote active learning, self-reflection, and collaboration among students. The Soft-ProM digital module was implemented in a software project management course for undergraduate students. Students' achievement motivation in the course significantly improved once the Soft-ProM digital module was introduced. The overall goal of this study is to show how an ADDIE model-based digital module, which called Soft-ProM, can increase students' enthusiasm and participation in college courses. The digital module built on the ADDIE model can be used in numerous situations and subject areas and offers a framework for creating instructional materials that are both effective and interesting.

**KEYWORDS:** Digital Modul, ADDIE Model, Motivation Achievement, Software Learning, Project Management.

## I. INTRODUCTION

Software project management is a discipline that involves the development, operation, and maintenance of software-intensive systems [1]. It

prepares students to become successful software developers, project managers, and IT professionals [2], [3]. Project management skills are essential for delivering winning projects, and many different professions contribute to the theory and practice of project management [4], [5].

Several teaching and learning strategies, including digital modules that use the most recent educational technologies and instructional design approaches, have been developed to solve this issue [6]–[9]. The ADDIE model, which offers a systematic and structured approach to developing successful digital learning materials, is one example of such a concept [10]–[13].

Software developers have found that traditional project management methodologies can be limiting [2], [3], [14]. However, many university students struggle with the subject, either due to a lack of interest, inadequate preparation, or insufficient support [4], [13].

In this article, we introduce the Soft-ProM digital module, which is based on the ADDIE paradigm and intended to increase university students' motivation for success in the study of software project management [15]–[17]. The module is made up of five main parts that correspond to the ADDIE phases: analysis of the needs and characteristics of the learners; development of instructional strategies and content; creation of multimedia materials and activities; implementation of the module in the classroom; and assessment of the module's success and impact [8], [18]–[20].

This paper aims to improve university students' achievement motivation in software project management subjects by presenting the design, development, implementation, and evaluation of a Soft-ProM digital module based on the ADDIE

paradigm. The purpose of this paper is to provide a detailed description of the project's justification, methodology, and results. This includes analysing the needs and characteristics of the learners, creating instructional strategies and content, creating multimedia materials and activities, putting the module into practice in the classroom, and assessing the module's success and impact.

The paper also aims to contribute to the existing literature on digital learning modules, instructional design models, and achievement motivation theories, by demonstrating the potential of the Soft-ProM module as an effective and engaging learning tool for software project management education. The findings of the study may also inform future research and development in this area, by identifying the strengths and limitations of the ADDIE model and the Soft-ProM module and highlighting the factors that contribute to students' motivation and engagement in software project management learning.

## **II. RESEARCH METHODS**

### **A. Research Design**

The Soft-ProM module's justification, design, and development process, as well as its deployment and evaluation outcomes in a practical classroom context, are all covered in this paper [2], [21], [22]. According to the research, the Soft-ProM module is a useful and interesting teaching tool that improves students' motivation for academic success, learning outcomes, and subject satisfaction [3], [6], [21]–[23]. Together with future opportunities for research and advancement in this field, the study's implications and limits are also highlighted [7], [12], [18], [24].

The study involved a group of university students who were enrolled in a software project management course. The group will do the traditional learning method and then received the Soft-ProM digital module based on the ADDIE model.

Before the intervention, the participants completed a pre-test to measure their achievement motivation and knowledge of software project management concepts. The participants then received the Soft-ProM module, which consisted of five main components based on the ADDIE model. The module included multimedia materials, interactive activities, and assessments, designed to enhance students' motivation and engagement with the subject.

The ADDIE model an instructional design model used in e-learning environments [10], [25] ADDIE model consists of five steps: Analysis, Design, Development, Implementation, and

Evaluation [8], [9], [13], [18]. A comparative study found that good instruction practices and approaches are related to the ADDIE model in distance online environments [6], [10], [19], [22], [26].

The explanation of each stage of the ADDIE model, as it relates to the development of the Soft-ProM Digital Module to improve university students' achievement motivation on Software Project Management Subject, as follows:

1 Analysis: To determine the learning needs of university students studying software project management, the researcher as instructional designer first conducts a needs assessment. The researchers gather information on students' existing subject-related knowledge, abilities, and attitudes as well as information on their preferred methods of learning and learning objectives. Also, researchers perform a content analysis to pinpoint the crucial subjects and ideas that must be covered in the digital module.

2 Design: The researcher creates the instructional strategy for the digital module based on the analysis. The researcher design learning objectives that are time-bound, relevant, explicit, measurable, and doable (SMART). Additionally, the researcher creates tests, instructional materials, and multimedia components such module interfaces and graphics that are in line with learning goals and user requirements.

3 Development: Using authoring programs Articulate Storyline as well as multimedia components including graphics, audio, and video, the researcher creates the Soft-ProM Digital Module. With the purpose of enhancing students' incentive for achievement and facilitating their learning, the researcher also includes interactivity, feedback, and exams.

4 Implementation: University students are given access to the Soft-ProM Digital Module online through a learning management system or a web platform. To ensure a seamless deployment of the module, the researcher offers instruction and technical support to professors and students. The researcher evaluates the module's efficacy and usability in addition to monitoring usage and gathering instructor and student feedback.

5 Evaluation: The researcher assesses the success of the Soft-ProM Digital Module and the results of the students' learning. The researcher solicits input on the module's content, design, and usability from teachers and students. The researcher also assesses how well the students did on the tests and how well they were doing on the learning goals. To better fulfil the learning needs and achievement motivation of university students studying software project management, the module's designer makes revisions and improvements based on the evaluation's findings.

## B. Population and Samples

A population sample of 30 university students based on gender and semester refers to a group of 30 students from a larger population which is students undertaking Software Project Management subject, who have been selected for research or analysis based on their gender and the semester they are enrolled in. The sample is divided into two categories: male and female, and two categories for semester: semester 6 and semester 8. These data can be seen in Table 1 below.

TABLE 1. RESEARCH SAMPLES

Category	Male	Female	Total
Semester 6	8	7	15
Semester 8	6	9	15
Total	14	16	30

## C. Research Instruments

The instrument for this research is the Soft-ProM Digital Module, learning material, Focus Group Discussion sheets, Pre-test sheets, and Post-test. The Soft-ProM Digital Module is likely to be a set of instructional materials or a learning management system that incorporates multimedia elements such as text, images, videos, quizzes, and interactive activities. It may also include assessments or evaluations that measure the effectiveness of the module in improving students' motivation and learning outcomes.

Learning materials that are typically covered in a Software Project Management subject including Introduction to Project Management, Requirements Gathering and Analysis, Project Planning, Software Development Life Cycle, Project Monitoring and Control, Project Communication, Project Closure. In addition to these modules, students are typically required to work on a project as part of the course. This project allows students to apply the principles and practices learned in the course to a real-world software project.

Through group conversations with the students, qualitative data is gathered using the FGD sheets. Typical FGD questions are about their overall impression of the Soft-ProM Digital Module (like or dislike), to what extent the Soft-ProM Digital Module has affected their achievement motivation in the software project management subject. The respondents also being asked to compare the Soft-ProM Digital Module with other learning materials or methods, and some other questions. The final question will be what are their suggestions that the Soft-ProM Digital Module be improved to better support their learning and motivation on the software project management subject?

Before to and following the use of the Soft-ProM Digital Module, the pre-test and post-test worksheets are used to gather quantitative data on the students' accomplishment motivation and their understanding of software project management.

## III. RESULTS AND DISCUSSION

### A. Soft-ProM Validation Results

The opinions of ten experts were sought specifically regarding the colors, shapes, video and audio quality, features, and relation to learning materials, after the Soft-ProM digital module, based on the ADDIE model, was implemented to increase university students' accomplishment motivation in software project management. The specialists were picked based on their backgrounds and specializations in instructional design and software project management.

The experts were requested to assess the Soft-ProM digital module's efficacy and offer suggestions for improving its conception and execution. To increase the module's efficacy, they were also asked for suggestions for any enhancements or changes.

The experts' responses were highly favourable, with all 10 of them stating that the Soft-ProM digital module had a great impact on students' drive for success and comprehension of software project management concepts. They appreciated the ADDIE model's application as a methodical strategy for instructional design and the module's layout. The experts also mentioned how well interactive multimedia components like films and simulations engaged university students with the subject matter.

The experts offered some helpful criticism on how the module may be improved. To assist students, implement the ideas they learned, some experts proposed adding more case studies and examples from the actual world to the program. Others proposed increasing possibilities for peer feedback and collaboration to raise student motivation and engagement.

Overall, the expert feedback offered insightful perspectives into the efficiency of the Soft-ProM digital module and recommendations for future enhancements. The favourable response suggests that the module is an effective instrument for educating university students about software project management, and the ideas for improvement will be considered in further editions of the program.

### B. FGD Results

In Table 2, each participant is assigned a numeric score from 1 to 100 for their overall impression of the module and their achievement motivation in the software project management

subject. These scores can help to provide a more quantitative representation of the FGD results and make it easier to compare the responses of different participants. However, it is important to keep in mind that FGDs are a qualitative research method, and the responses should be interpreted in the

context of the participants' individual experiences and perspectives. It also shows their overall impression of the module and how it has affected their achievement motivation in the software project management subject.

TABLE 2. FGD RESULTS

Participant	Overall Impression	Achievement Motivation
AA-1	Well-designed and user-friendly. Multimedia elements are helpful.	More motivated to learn about software project management. Interactive elements and gamification aspects make it more enjoyable.
HE-1	Likes self-paced learning but wants more practical examples and case studies.	Boosted confidence in understanding and applying software project management principles. More interested in pursuing a career in this field.
SU-1	Appreciates flexibility but found some content too basic.	More aware of the importance of software project management and motivated to improve skills in this area.
BA-1	Provides a good overview but prefers more interactive activities.	More confident in using software project management tools and techniques. More interested in learning about project management methodologies.
RI-1	Likes accessibility on multiple devices but wants bigger font size.	More engaged with subject matter. Interactive elements have helped to keep focused and motivated.
AH-1	Found it useful and informative but wants more challenging assessment questions.	More conscious of the advantages and disadvantages of managing software projects. Motivated to look for extra assistance and tools to further their talents.
NU-1	Appreciates effort but found audio quality in some video's poor.	More motivated to learn about software project management. Module has made subject matter more accessible and interesting.
HA-1	Likes ADDIE model structure but wants more opportunities for collaborative learning.	More eager to investigate various project management techniques. The module has made it easier to understand the importance of using project management principles in many situations.
SU-2	Found content relevant and up to date but wants more opportunities for feedback and guidance.	More confident in applying software project management principles to real-world projects. Practical examples and case studies have been particularly helpful.
IH-1	Thinks module is well-organized and easy to navigate but found some graphics distracting and unnecessary.	The significance of project management in software development initiatives is better understood. The module has made it easier to comprehend how project management can increase the effectiveness and caliber of software initiatives.

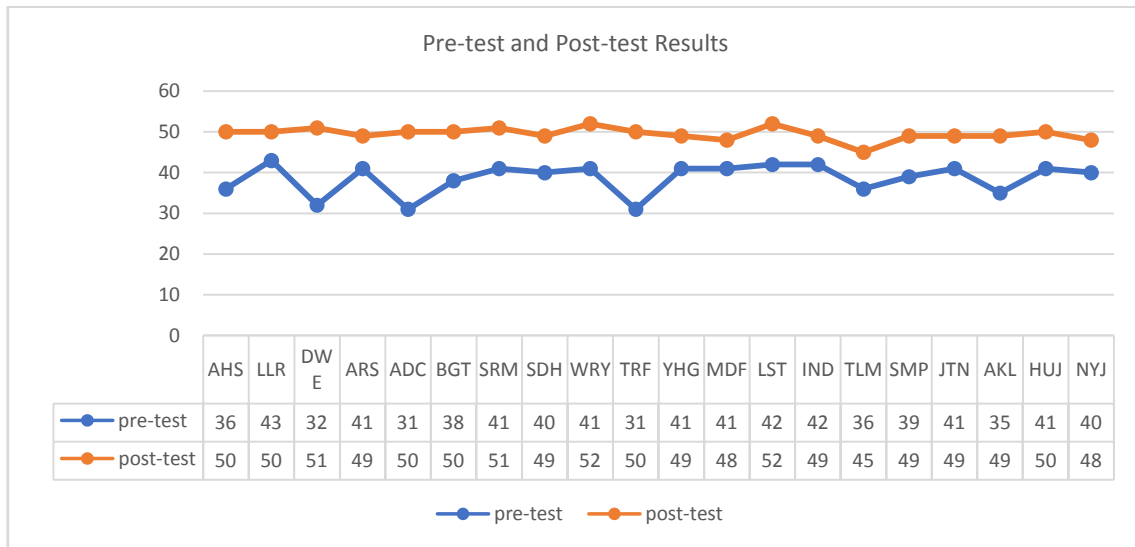


Figure 1. Pre-test and Post-test Results

### C. Pre-test and Post-test Results

The result of pre-test and post-test can be seen from this graph, in Figure 1. This graph shows the results of a pre-test and post-test for 20 participants who receive traditional learning method for pre-test, then doing Soft-ProM digital module to study Software Project Management subject and fill out post-test. The x-axis (horizontal) is the initial name of the participants and y-axis (vertical) of the graph is the score of pre-test and post-test. The pre-test scores are represented by blue colour, while the post-test scores are represented by an orange colour. The trend of the data points of pre-test score is within range 32-43. And there is a clear increase in scores from the pre-test to the post-test, with almost all participants improving their scores within range 45-52. The increase in scores is statistically significant.

### D. Descriptive statistics

The goal of the paired sample t-test is to ascertain whether the means of the two paired samples differ. The learning outcomes that students achieve while using animated learning media based on local knowledge will serve as the sample used to test the hypothesis. The findings of the T-test analysis revealed that the mean score before (54.82) and after the intervention was different (81.02).

According to the results of the investigation, the sample t-test correlation is 0.534, with a significance level of 0.000. Because the t-test calculation result is Sig. 2-tailed 0.000 = 5% or 0.050, it can be inferred that there is a significant difference between university students' achievement motivation at the pre-test before using Soft-ProM digital module and the students' post-test results after

using Soft-ProM. As a result, Hypothesis Ha is Accepted.

### E. Discussion

The ADDIE model-based Soft-ProM digital module was created to increase university students' achievement motivation in software project management [27]–[29]. The goal of this study was to assess how well the Soft-ProM digital module increased students' motivation for academic accomplishment. The main conclusions of the study and its ramifications are summarized in the discussion that follows.

The findings of this study demonstrate that the Soft-ProM digital module can greatly raise students' aspiration for success in the study of software project management. This result is in line with earlier studies that found using digital learning resources can increase university students' motivation and engagement [30]–[32]. The module was created using the ADDIE model, which ensured that it was detailed and adhered to a systematic approach [33]–[35].

The study also discovered that students who studied the digital Soft-ProM program demonstrated a notable improvement in their comprehension of software project management principles [2]–[4]. This indicates that the program was successful in assisting students in acquiring the information and abilities required to be successful in software project management [30]–[32]. The module's interactive multimedia components, which included films, simulations, and quizzes, encouraged students to connect with the material and put what they had learned to use.



#### IV. CONCLUSION

This study's conclusions have significant results for teachers and instructional designers. University students can benefit from the utilization of the Soft-ProM digital module as a useful teaching resource for software project management. The ADDIE model can be used to guarantee that digital learning resources are comprehensive when designing education for other topic areas. To increase student engagement and motivation, educators should think about integrating digital learning resources into their lesson plans, such as the Soft-ProM digital module.

It is crucial to remember that the study had some restrictions. The findings may not be as broadly applicable as they could be because the study only covered a small sample of college students. The lack of a control group in the study makes it difficult to determine whether the gains in accomplishment motivation were brought on by the Soft-ProM digital module or other factors. To further assess the efficacy of the Soft-ProM digital module, future studies should utilize bigger, more diverse student samples, as well as control groups.

In conclusion, it was discovered that the Soft-ProM digital module, which is based on the ADDIE model, is a useful instrument for enhancing university students' achievement motivation in software project management. The results of this study have significant ramifications for teachers and instructional designers who aim to improve motivation and engagement in their classroom activities. To completely assess the performance of the Soft-ProM digital module and to ascertain its potential applicability in other subject areas, more research is required.

#### Acknowledgement

We would like to express our sincere appreciation to MajelisDiktilitbang PP Muhammadiyah and Muhammadiyah University of Palangkaraya through LP2M for their generous support in funding this project. Without their financial assistance, this research would not have been possible. Their contribution has enabled us to make significant progress in our research, and we are grateful for their support. Thank you.

#### REFERENCES

- [1]. C. T. Cerdeiral and G. Santos, "Software project management in high maturity: A systematic literature mapping," *J. Syst. Softw.*, vol. 148, pp. 56–87, 2019, doi: 10.1016/j.jss.2018.10.002.
- [2]. S. Deep, S. Banerjee, S. Dixit, and N. I. Vatin, "Critical Factors Influencing the Performance of Highway Projects: Empirical Evaluation of Indian Projects," *Buildings*, vol. 12, no. 6, pp. 1–14, 2022, doi: 10.3390/buildings12060849.
- [3]. A. Cazorla-Montero, I. de los Ríos-Carmenado, and J. I. Pasten, "Sustainable development planning: Master's based on a project-based learning approach," *Sustain.*, vol. 11, no. 22, pp. 1–23, 2019, doi: 10.3390/su11226384.
- [4]. W. E. Hefley and M. Bottion, "Skills of junior project management professionals and project success achieved by them," *Int. J. Inf. Syst. Proj. Manag.*, vol. 9, no. 1, pp. 56–75, 2021, doi: 10.12821/ijispm090103.
- [5]. A. Khandakar, M. E. H. Chowdhury, A. S. P. Gonzales, F. Touati, N. Al Emadi, and M. A. Ayari, "Case study to analyze the impact of multi-course project-based learning approach on education for sustainable development," *Sustain.*, vol. 12, no. 2, pp. 1–21, 2020, doi: 10.3390/su12020480.
- [6]. A. Trisiana, "Innovation design development of citizenship education model on characters of Indonesian communities in digital media era and technology revolution," *Int. J. Recent Technol. Eng.*, vol. 8, no. 2 Special Issue 9, pp. 322–328, 2019, doi: 10.35940/ijrte.B1074.0982S919.
- [7]. R. A. Salas-Rueda, "Design, construction and evaluation of a web application for the teaching-learning process on financial mathematics," *Int. J. Emerg. Technol. Learn.*, vol. 15, no. 8, pp. 100–115, 2020, doi: 10.3991/IJET.V15I08.12275.
- [8]. N. Suprpto, W. Nandyansah, and H. Mubarak, "An evaluation of the 'PicsAR' research project: An augmented reality in physics learning," *Int. J. Emerg. Technol. Learn.*, vol. 15, no. 10, pp. 113–125, 2020, doi: 10.3991/ijet.v15i10.12703.
- [9]. M. Murdiono, Suyato, E. N. Rahmawati, and M. A. Aziz, "Developing an android-based mobile application for civic education learning," *Int. J. Interact. Mob. Technol.*, vol. 14, no. 16, pp. 180–193, 2020, doi: 10.3991/ijim.v14i16.14967.
- [10]. A. G. Spatioti, I. Kazanidis, and J. Pange, "A Comparative Study of the ADDIE Instructional Design Model in Distance Education," *Information*, vol. 13, no. 9, p. 402, Aug. 2022, doi: 10.3390/info13090402.
- [11]. N. Ulfatin, A. B. N. R. Putra, Y. M. Heong,

- A. Zahro, and A. D. Rahmawati, "Disruptive Learning Media Integrated E-Generator Practice System to Advance Self-Efficacy Learners Levels in Era of Education 4.0," *Int. J. Interact. Mob. Technol.*, vol. 16, no. 4, pp. 4–16, 2022, doi: 10.3991/ijim.v16i04.28993.
- [12]. A. Shah, Suhailiezana, C. G. C. Kob, and M. Khairudin, "Effectiveness of m-learning applications for design and technology subject," *Int. J. Interact. Mob. Technol.*, vol. 13, no. 10, pp. 120–133, 2019, doi: 10.3991/ijim.v13i10.11324.
- [13]. S. R. Ningsih, Z. M. Effendi, and N. Syah, "Implementation of cooperative learning model on E-assignment responsiveness at higher education," *Int. J. Emerg. Technol. Learn.*, vol. 14, no. 18, pp. 209–219, 2019, doi: 10.3991/ijet.v14i18.10752.
- [14]. R. Rusmanto and K. Rukun, "The Development of E-Learning Module Based on Project-Based Learning (PjBL) for Electric Motor Installation Course," *J. Educ. Res. Eval.*, vol. 4, no. 2, p. 181, 2020, doi: 10.23887/jere.v4i2.24608.
- [15]. W. Ng and J. Fergusson, "Technology-Enhanced Science Partnership Initiative: Impact on Secondary Science Teachers," *Res. Sci. Educ.*, vol. 49, no. 1, pp. 219–242, 2019, doi: 10.1007/s11165-017-9619-1.
- [16]. Asrial, Syahrial, D. A. Kurniawan, F. Chan, R. Septianingsih, and R. Perdana, "Multimedia innovation 4.0 in education: E-modul ethnoconstructivism," *Univers. J. Educ. Res.*, vol. 7, no. 10, pp. 2098–2107, 2019, doi: 10.13189/ujer.2019.071007.
- [17]. Astalini, Darmaji, W. Kurniawan, K. Anwar, and D. A. Kurniawan, "Effectiveness of using e-module and e-assessment," *Int. J. Interact. Mob. Technol.*, vol. 13, no. 9, pp. 21–39, 2019, doi: 10.3991/ijim.v13i09.11016.
- [18]. A. Bahri, I. S. Idris, H. Muis, M. Arifuddin, and M. J. N. Fikri, "Blended Learning Integrated with Innovative Learning Strategy to Improve Self-Regulated Learning," *Int. J. Instr.*, vol. 14, no. 1, pp. 779–794, 2020, doi: 10.29333/IJI.2021.14147A.
- [19]. E. Widyastuti and Susiana, "Using the ADDIE model to develop learning material for actuarial mathematics," *J. Phys. Conf. Ser.*, vol. 1188, no. 1, 2019, doi: 10.1088/1742-6596/1188/1/012052.
- [20]. Y. Kartika, R. Wahyuni, B. Sinaga, and J. Rajagukguk, "Improving Math Creative Thinking Ability by using Math Adventure Educational Game as an Interactive Media," *J. Phys. Conf. Ser.*, vol. 1179, no. 1, 2019, doi: 10.1088/1742-6596/1179/1/012078.
- [21]. H. E. Rudyanto, A. Ghufron, and Hartono, "Use of integrated mobile application with realistic mathematics education: A study to develop elementary students' creative thinking ability," *Int. J. Interact. Mob. Technol.*, vol. 13, no. 10, pp. 19–27, 2019, doi: 10.3991/ijim.v13i10.11598.
- [22]. Z. Ozdilek and E. Robeck, "Operational priorities of instructional designers analyzed within the steps of the Addie instructional design model," *Procedia - Soc. Behav. Sci.*, vol. 1, no. 1, pp. 2046–2050, 2009, doi: 10.1016/j.sbspro.2009.01.359.
- [23]. T. N. Astuti, K. H. Sugiyarto, and J. Ikhsan, "Effect of 3D visualization on students' critical thinking skills and scientific attitude in chemistry," *Int. J. Instr.*, vol. 13, no. 1, pp. 151–164, 2020, doi: 10.29333/iji.2020.13110a.
- [24]. I. J. Fitriyah, M. F. Marsuki, and Y. Affriyenni, "Development of E-learning Based on Augmented Reality (AR) on Reduction-Oxidation Reaction Topic," *Int. J. Interact. Mob. Technol.*, vol. 16, no. 3, pp. 151–158, 2022, doi: 10.3991/IJIM.V16I03.28977.
- [25]. A. M. Almelhi, "Effectiveness of the ADDIE Model within an E-Learning Environment in Developing Creative Writing in EFL Students," *English Lang. Teach.*, vol. 14, no. 2, p. 20, Jan. 2021, doi: 10.5539/elt.v14n2p20.
- [26]. P. Bhushan, "Module 4," *Dermatology a Week*, pp. 68–68, 2006, doi: 10.5005/jp/books/10200\_4.
- [27]. C.- Pandemic, J. Yu, and Y. Jee, "education sciences Analysis of Online Classes in Physical Education during the," 2021.
- [28]. S. S. Pratiwi, J. H. G. Purwasih, D. S. Rozakiyah, D. W. Apriyadi, and I. W. P. Utami, "Developing E-Module for Prospective Sociology Educators: Constructing Multiple Choice Questions Based on Higher Order Thinking Skill (HOTS)," *Int. J. Emerg. Technol. Learn.*, vol. 16, no. 7, pp. 249–256, 2021, doi: 10.3991/ijet.v16i07.21197.
- [29]. E. Suparman, S. Muslim, N. Ibrahim, A.

- Rahmayanti, and J. L. Siang, "Development of accounting information system modul learning in universitas Persada Indonesia," *Int. J. Recent Technol. Eng.*, vol. 8, no. 2 Special Issue 9, pp. 339–344, 2019, doi: 10.35940/ijrte.B1078.0982S919.
- [30]. R. Dwijuliani, T. Rijanto, Munoto, L. Nurlaela, I. Basuki, and Maspiyah, "Increasing student achievement motivation during online learning activities," *J. Phys. Conf. Ser.*, vol. 1810, no. 1, 2021, doi: 10.1088/1742-6596/1810/1/012072.
- [31]. M. Ahmed and E. Osman, "the Effectiveness of Using Wiziq Virtual Classroom on Students' Achievement and Motivation," *ICERI2018 Proc.*, vol. 1, no. January, pp. 8187–8195, 2018, doi: 10.21125/iceri.2018.0048.
- [32]. U. M. Ibrahim and A. R. Alamro, "Effects of Infographics on Developing Computer Knowledge, Skills and Achievement Motivation among Hail University Students," *Int. J. Instr.*, vol. 14, no. 1, pp. 907–926, 2020, doi: 10.29333/IJI.2021.14154A.
- [33]. N. Lee and S. J. Kim, "A Systematic Course Design Approach to Guide the Development of a Construction Engineering and Management Capstone Course," *2020 Annu. Conf. Northeast Sect. ASEE-NE* 2020, 2020, doi: 10.1109/ASEENE51624.2020.9292652.
- [34]. M. Fang, X. Zheng, W. Hu, and J. Shen, "On the ADDIE-based effective instructional design for higher education classrooms," *Adv. Mater. Res.*, vol. 271–273, pp. 1542–1547, 2011, doi: 10.4028/www.scientific.net/AMR.271-273.1542.
- [35]. K. Mullins, "Good IDEA: Instructional Design Model for Integrating Information Literacy," *J. Acad. Librariansh.*, vol. 40, no. 3–4, pp. 339–349, 2014, doi: 10.1016/j.acalib.2014.04.012.