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Development of a Learning Model Using Practical Unit Modules for Electrical Installation at SMK Negeri 3 Makassar

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Abstract
Module is one of the teaching materials that can be used by students, either independently or with the assistance of a teacher. Therefore, it is important to develop modules so that they can function optimally as effective learning guides for students. The objective of this study was to develop a practical learning module for electrical installation. The research employed the Research and Development (R&D) method. The stages of the research included: (1) identifying potentials and problems, (2) data collection, (3) product design, (4) product validation, (5) product revision, (6) product testing, (7) further revision, and (8) analysis and reporting. The research design used was Pretest-Posttest Control Group Design. Based on the validity aspects, the results of the development of the practical module for electrical installation are as follows: (1) practical module 1 obtained a score of 85.86% and was categorized as valid; (2) practical module 2 obtained a score of 87.75% and was categorized as valid; and (3) practical module 3 obtained a score of 86.31% and was categorized as highly valid. Student learning activities using the practical electrical installation module were significantly higher compared to students who used worksheets (LKS). Learning outcomes in the cognitive, affective, and psychomotor domains of students who used the practical module were significantly higher than those who used worksheets, with a significance value of 0.001.

Keywords: *Student Learning Activities, Llearning Outcomes, Cognitive, Affective, Psychomotor Domains.*

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INTRODUCTION

Education plays a pivotal role in the development of individuals, serving as a cornerstone for cultivating human capital that can provide a nation with a competitive edge. (Asrifan et al., 2023) As such, the pursuit of educational excellence must be sustained and deliberate, particularly through the refinement of instructional practices within the classroom setting. A promising strategy to

support this goal involves the use of well-organized learning modules (Sujarwo et al., 2024). These modules not only foster greater student participation but also enhance the depth and consistency of learning experiences, ultimately contributing to the attainment of established competency standards (KKM).

(Haristah et al., 2019) assert that a module is an educational resource systematically structured and articulated using language tailored to the learners' developmental stage and level of comprehension. This intentional design aims to empower students to undertake learning independently, requiring only limited instructor intervention. Complementing this view, (Jusuf et al., 2021) describe a module as a printed instructional material specifically developed to support autonomous study. They emphasize that such resources function as tools for self-guided learning, offering clearly defined instructions that enable students to progress through the material without continuous guidance from a teacher.

This conceptualization is reinforced by (Nengsih & Febrina, 2021) who define a module as a pedagogical document that incorporates learning outcomes, instructional content, and student-centered activities designed to promote self-sufficiency in learning. In a similar vein, (Muhammad Basir & Pd, 2017) note that while definitions of a module may vary across contexts, there is a general agreement that a module constitutes a comprehensive curricular unit designed to support individualized and self-regulated learning experiences.

Building upon the aforementioned conceptualizations, the Ministry of National Education articulates that a module is a pedagogical resource developed with the specific purpose of enabling learners to engage in self-directed study, either independently or with limited instructional support. To fulfill this function effectively, a module must incorporate several essential components, including instructional guidelines, clearly defined learning competencies, subject matter content, supplementary information, practical exercises, structured learning activities (such as worksheets), assessment instruments, and evaluative feedback. The true efficacy of a module is realized when learners can navigate and utilize its content with ease and autonomy (Akhiruddin et al., 2023).

In the context of vocational education, particularly for students enrolled in the Electrical Power Engineering or Electrical Engineering programs at Vocational High Schools (SMK), mastery of electrical installation is critical, not only in theoretical understanding but also in the cultivation of appropriate attitudes and practical skills. At SMK Negeri 3 Makassar, the electrical installation practicum constitutes a fundamental component of the curriculum, wherein students are expected to acquire, comprehend, and demonstrate proficiency in the core principles of electrical installation. However, empirical observations reveal that many students perceive the subject as challenging and conceptually demanding.

To address this pedagogical challenge, the development of a specialized practical module focused on electrical installation is deemed essential. This instructional tool should be aligned with the national curriculum framework, particularly the Core Competencies (Kompetensi Inti/ KI) and Basic Competencies (Kompetensi Dasar/ KD), and should offer sequential guidance for the implementation of practical tasks related to lighting installation. Beyond

theoretical explanations, the module must provide explicit, step-by-step instructions to support students in executing hands-on practices in accordance with the prescribed competencies (Sumarmi et al., 2021).

A well-designed practical module serves not only as a structured learning aid but also as a means of enhancing student engagement and academic achievement. By offering accessible, organized content and promoting self-regulated learning, such modules are particularly valuable in vocational education settings, where experiential learning and skill acquisition are paramount. Ultimately, the use of practical modules can significantly improve the quality of instructional delivery and foster greater independence and confidence among learners.

In response to this need, a study was conducted under the title: "Development of a Learning Model Using Practical Unit Modules for Electrical Installation at SMK Negeri 3 Makassar." This research aims to evaluate the effectiveness of the developed modules in enhancing students' understanding, skills, and attitudes in electrical installation. The expected outcome is to produce a learning model that can be used across similar educational settings, providing a valuable tool for improving practical learning and achieving the Minimum Competency Criteria (KKM).

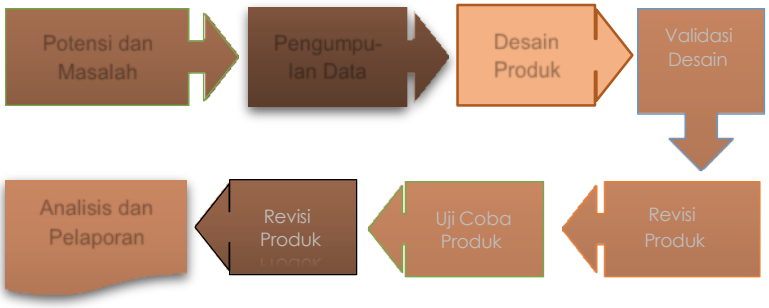
Based on the title, the research questions can be formulated as follows: (1) What is the validity of the developed electrical installation practicum learning module? (2) How do students engage in learning activities when using the electrical installation practicum learning module? (3) How do students' learning outcomes compare after using the electrical installation practicum learning module.

In accordance with the research questions, the objectives of this study are: (1) to analyze the validity of the developed electrical installation practicum learning module; (2) to analyze students' learning activities when using the electrical installation practicum learning module; and (3) to analyze students' learning outcomes after using the electrical installation practicum learning module.

METHOD

The steps and procedures of the research and development used in this study are shown in Figure 1 below

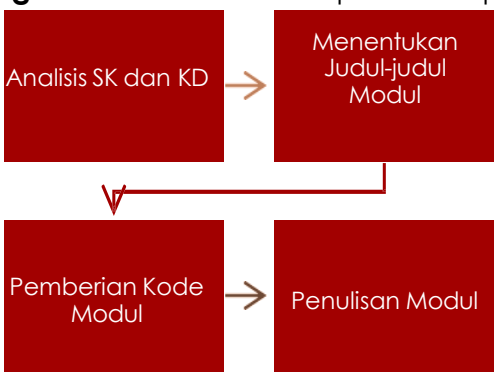
Figure 1. Steps of R&D Method



(Dr. Arif Rachman, Dr. E. Yochanan, 2024)

The flow and procedure for module development according to Depdiknas (2008:20) can be seen in Figure 2 below.

Figure 2. Module Development Steps



This research employed the Research and Development (R&D) method to design, validate, and evaluate a practical learning module for electrical installation. The development model used in this study refers to the module development procedures outlined by the Ministry of National Education (Depdiknas, 2008), which consist of a series of systematic steps to ensure the quality and applicability of the instructional materials.

The module development process comprised the following steps:

1. Analysis
   The analysis stage aimed to identify specific topics that required the development of instructional materials. This involved examining the core content of the subject matter, identifying the competencies students are expected to achieve, and defining the critical learning outcomes (CLOs) that align with vocational learning standards.
2. Determining the Module Title
   Module titles were formulated based on Basic Competencies (Kompetensi Dasar/KD) or the subject content listed in the syllabus. A competency was selected as a module title if it was sufficiently specific. A guideline used in this process was that a competency could be developed into a standalone module if it could be broken down into no more than four main topics (materi pokok/MP).
3. Module Coding
   To support systematic management, each module was assigned a specific code. These codes were numerical and meaningful—for instance, the first digit denoted the academic subject area (e.g., "1" for Mathematics and Language), while the second digit represented the classification, major field of study, core activity, or specialization associated with the student's vocational department.
4. Module Writing
   The module writing process involved several key stages:
   - Formulating the specific Basic Competencies (KD) to be achieved by students.

- Designing appropriate evaluation and assessment instruments aligned with learning objectives.
- Organizing the instructional content in a clear and coherent manner.
- Sequencing learning activities to support progressive student understanding.
- Structuring the module layout to include instructional guidance, exercises, assessments, and feedback mechanisms to support independent learning.

Each module was developed to align with the national vocational education standards and was intended to serve as a self-directed learning tool for students in the Electrical Power Installation program at SMK Negeri 3 Makassar. The development of the modules also took into consideration pedagogical principles, including clarity of content, student engagement, and the promotion of practical competencies.

Following the development phase, the modules were validated by subject matter experts and tested in a classroom setting to assess their effectiveness in improving student activity and learning outcomes in cognitive, affective, and psychomotor domains.

Based on the procedures and steps undertaken in the development of the modules, a draft of the modules was produced as follows: (1) Module 1 focuses on drawing electrical installations in building structures; (2) Module 2 covers installing electrical installations in building structures; and (3) Module 3 deals with inspecting electrical installations in building structures.

The next step is to conduct a trial of Modules 1, 2, and 3 to determine their effectiveness using a research design known as the "pre-test–post-test control group design."

The population of this study comprises all students majoring in Electrical Power Engineering in the Electrical Installation Engineering Program at SMK Negeri 3 Makassar, totaling 350 students. The sample consists of students in class XI of the Electrical Power Engineering program.

Several variables are involved in this study, namely independent, control, and dependent variables. The independent variable is the practical module on electrical installation; the control variable is the electrical installation practicum subject; and the dependent variables include: (1) students' learning activities; (2) cognitive learning outcomes; (3) affective learning outcomes; and (4) psychomotor learning outcomes.

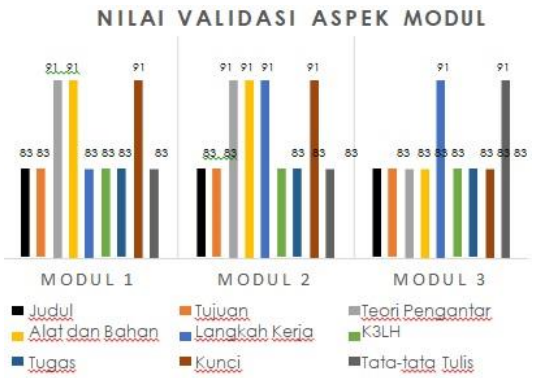
RESULT AND DISCUSSION

The results of this study include: (1) data from the module validation process; (2) data on students' learning activities; (3) cognitive learning outcomes; (4) affective learning outcomes; and (5) psychomotor learning outcomes.

The drafted modules were validated by three experts. The validators consisted of two lecturers from the Department of Electrical Engineering at Universitas Negeri Makassar and Universitas Teknologi Sulawesi, and one vocational teacher from SMK Negeri 3 Makassar.

The validation results for Module 1, Module 2, and Module 3 are presented in Figure 4 below.

Figure 4. Graph of the Validation Results for Modules 1, 2, and 3 Based on Several Assessment Aspects

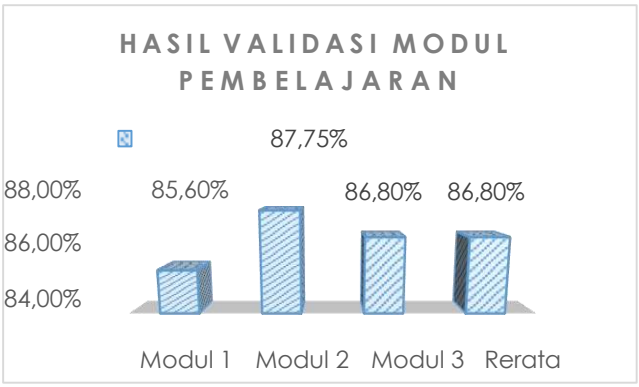


The validation results for Module 1 indicate the following scores for each aspect: (1) the title received a score of 83; (2) learning objectives scored 83; (3) theoretical background scored 91; (4) tools and materials scored 91; (5) procedural steps scored 83; (6) occupational safety and health (OSH) scored 83; (7) assignments scored 83; (8) answer key scored 91; and (9) writing mechanics scored 83.

The validation scores for Module 2 are as follows: (1) title: 83; (2) objectives: 83; (3) theoretical background: 91; (4) tools and materials: 91; (5) procedural steps: 91; (6) OSH: 83; (7) assignments: 83; (8) answer key: 91; and (9) writing mechanics: 83.

Meanwhile, the validation scores for Module 3 are: (1) title: 83; (2) objectives: 83; (3) theoretical background: 91; (4) tools and materials: 83; (5) procedural steps: 83; (6) OSH: 83; (7) assignments: 83; (8) answer key: 83; and (9) writing mechanics: 91.

Figure 5. Validation Results Graph for Modules 1, 2, and 3



The results of the validation of the developed modules are as follows: (1) the average score for Module 1 is 85.60%; (2) the average score for Module 2 is 87.75%; and (3) the average score for Module 3 is 86.80%. Observations of student learning activities during the learning process using the modules yielded the following results: (1) in the first meeting, the reliability score was 99.1%; (2) in the second meeting, the reliability score was 98.1%; (3) in the third meeting, the reliability score

was 98.7%; and (4) in the fourth meeting, the reliability score was 99.7%, resulting in an average reliability of 98.95%, categorized as good (≥75%). There was a significant difference in learning activities, with students using the electrical installation module showing notably higher learning activity levels compared to those using the LKS (student worksheets).

Cognitive learning outcomes were measured using written tests administered at the beginning (pre-test) and at the end (post-test) of the learning process to determine the improvement in scores. The cognitive learning outcomes for the control class showed an improvement of 0.49, categorized as moderate (with a range of $0.3 \leq g \leq 0.7$), while the experimental class demonstrated a higher improvement of 0.7, categorized as high (with a range of $g \geq 0.7$). This indicates that the experimental class, which used the practical modules, achieved a greater improvement in cognitive learning outcomes. The cognitive learning outcomes in the experimental class had a gain score of 0.72, compared to a gain score of 0.40 in the control class, which did not use the module and followed conventional methods. These data indicate a significant difference between pre-treatment and post-treatment scores.

Affective learning outcomes were assessed using an attitude rating sheet covering aspects such as honesty, discipline, resilience, responsibility, cooperation, and mutual respect. The control class achieved an average score of 71, while the experimental class obtained an average score of 74. These results indicate a significant difference between pre-treatment and post-treatment scores.

Psychomotor learning outcomes were measured over nine practical sessions, as outlined in the practical worksheets. The control class had an average psychomotor score of 76.87, which was lower than the experimental class, which achieved an average score of 83.72. These results show a significant difference between students who used the electrical installation practical module and those who did not.

The study concludes that: (1) the electrical installation practical module has a positive and significant impact on student learning activities, particularly related to visual activities, listening activities, and lighting activities; and (2) the electrical installation practical module can enhance the learning activities of Grade XI Electrical Power Engineering students at SMK Negeri 3 Makassar.

The results of this study align with the findings of research by (Sunarko & Joko, 2023), titled "Development of a Job Sheet for Motor Repair as a Learning Media for Practical Students of Class XI TIPTL at SMK PGRI 1 Lamongan." Their study concluded that the learning activities of students using the job sheet were categorized as very good. Learning activities are a series of actions that include student engagement in following lessons, asking questions for clarification, taking notes, listening, thinking, reading, and any other activities that contribute to academic achievement. According to (Suparyanto dan Rosad (2015, 2020), learning activities are divided into physical and mental activities, while (Suryana et al., 2022) argue that student engagement in learning takes various forms, ranging from physical activities that are easy to observe to psychological activities that are more difficult to observe. Observable physical activities include reading, listening, writing, demonstrating, and measuring.

Learning activities encompass eight categories, four of which are visual activities, such as reading, viewing images, observing experiments, demonstrations, exhibitions, and watching others work or play. The student learning activities in this study can be attributed to: (1) the modules, which include materials, practice exercises, and guides on how to perform practical tasks that

support visual activities, listening activities, and lighting activities for Class XI TTL students at SMK Negeri 3 Makassar; (2) the interest of Class XI TTL students at SMK Negeri 3 Makassar in challenges and new things, particularly those that enhance their practical skills; (3) the high curiosity of almost all Class XI TTL students at SMK Negeri 3 Makassar; and (4) assignments that are completed individually or in groups, requiring students to be active both in and outside the classroom. Students who take an active role during the learning process are able to optimize their learning activities (Asdar et al., 2024).

The learning outcomes analyzed in this study encompass the cognitive, affective, and psychomotor domains. A significant difference was found in the learning outcomes, with students who used the electrical installation practical module achieving significantly higher results in all three domains compared to those who used the student worksheets (LKS).

The findings of this study also support the literature review presented by (Ilmiah & Guru, 2024)), which states that a module is a teaching aid that contains materials, practical guides, and practice exercises, which can help students enhance their skills, both with the assistance of a teacher and independently.

A module is a book designed to enable learners to study independently, with or without the guidance of a teacher. The module at least includes learning instructions, competencies to be achieved, learning content, supporting information, exercises, worksheets (LK), evaluations, and feedback on the evaluation results. A module will be effective if students can use it easily. This view aligns with the definition of a module according to (Aisy & Andriani, n.d.)who state that a module is a teaching material organized systematically using language that is easy to understand by students, in accordance with their level of knowledge and age, so that they can learn independently with minimal help or guidance from the instructor.

Meanwhile, according to (Jusuf et al., 2021)a module is a printed teaching material designed to allow learners to study it independently. The module is also referred to as a self-learning media because it includes instructions for self-study.

The findings of this study are consistent with the research conducted by (GALIH SETIADI, 2018), which concluded that the lighting installation trainer developed is appropriate for use as a learning tool for electrical installation in the Electronics Expertise Program at MAN Kendal. The feasibility of the trainer was assessed based on a feasibility test conducted by experts, which yielded a score of 80%, categorized as good. Similarly, student responses to the lighting installation trainer showed a positive result, with a percentage of 86%, categorized as excellent. A significant difference was observed in the students' learning outcomes before and after utilizing the lighting installation trainer as a learning medium for electrical installation. Specifically, the average practical score increased from 77.91 prior to using the trainer to 81.30 after the trainer was employed.

The results of this study also align with the research conducted by (Prabowo et al., 2016), who carried out a development study that followed a sequence of steps, including needs analysis, media planning, product development, validation, individual trials, revisions, small group trials, further revisions, and final product creation. Based on the results of validation and trials, the validity percentages obtained were as follows: (1) from subject matter experts, 87.20%; (2) from media experts, 89.65%; and (3) from small groups, 89.73%. In another study, Hari (2013) discovered that the online electrical installation e-module, which focused on installation procedures and safety in distance education, was deemed suitable for

use as a learning tool. Additional studies supporting these findings include Gilang's (2018) research, which concluded that the developed product was validated and tested on 15 students from the 2014 PTE program (small group trial), 30 students for field testing, and 17 students from the D3 TE program to evaluate the product's usability in fostering student creativity. The developed module was found to be effective in stimulating students' creativity.

CONCLUSION AND RECOMMENDATION

Based on the research findings and the analysis presented above, several key conclusions can be drawn. First, the developed instructional module on electrical installation practice demonstrates a high level of feasibility, with an average score of 86.8%. This score categorizes the module as highly appropriate for use as an effective learning medium, serving as a supportive tool for students to understand the material both independently and under the guidance of an instructor.

Second, the analysis of student learning activities indicates that the use of the practical electrical installation module has a significantly positive impact on student engagement in the learning process. Students who learned with the module exhibited higher levels of learning activity compared to those who used conventional student worksheets (LKS).

Third, in terms of learning outcomes across cognitive, affective, and psychomotor domains, students who participated in instruction using the practical module showed significantly greater improvement than those in the control group using traditional worksheet-based methods. These findings suggest that the module is not only effective in enhancing students' theoretical knowledge but also in fostering their attitudes and practical skills more comprehensively.

Recommendation

Based on the findings obtained from this study, several strategic recommendations can be proposed for future development. First, it is recommended that the instructional content in the electrical installation practicum module be further expanded and elaborated. Broadening the scope and increasing the depth of content related to electrical installation techniques is essential to enrich students' knowledge and enhance both their conceptual understanding and practical skills.

Second, for future researchers, it is advisable to use the electrical installation practicum module implemented at SMK Negeri 3 Makassar as a point of comparison with various forms of interactive learning modules and other instructional approaches. The goal is to examine and evaluate the effectiveness of each method in improving the quality of the learning process and outcomes, thereby identifying the most optimal instructional strategies.

REFERENCES

Aisy, D. R., & Andriani, S. (n.d.). Pengembangan E-Modul Berbantuan Sigil Software Dengan Pendekatan Saitifik Pada Materi Sistem Persamaan Linier Dua Variabel (SPLDV). 8(1), 61–71.

Akhiruddin, A., Amir, A., . S., . R., . S., . J., Salemuddin, Muh. R., . S., & Iskandar, Abd. M. (2023). Developing Digital Sociology Module Based Multicultural for Students' Learning Outcomes Improvement. KnE Social Sciences. https://doi.org/10.18502/kss.v8i18.14303

Asdar, A.Vivit Angreani, Andi Ramadhana. B, & Nani Sri Fitri Nurheni. (2024). Desain Bahan Ajar Keterampilan Menulis Berbasis Pendekatan Integratif Sebagai Implementasi Model Kemp Siswa SD Inpres Kota Makassar. EDULEC : Education, Language, and Culture Journal, 4(1), 94–107. https://doi.org/10.56314/edulec.v4i1.219

Asrifan, A., Ibna Seraj, P. M., Sadapotto, A., Nurhumairah, & K. J. Vargheese. (2023). The Implementation of Kurikulum Merdeka as The Newest Curriculum Applied at Sekolah Penggerak in Indonesia. IJOLEH : International Journal of Education and Humanities, 2(1), 62–74. https://doi.org/10.56314/ijoleh.v2i1.130

Dr. Arif Rachman, Dr. E. Yochanan, Dr. Ir. A. I. S. (2024). Dan R & D.

GALIH SETIADI, A. (2018). Pengembangan Modul Pembelajaran Praktik Instalasi Penerangan Listrik Di Smk Negeri 5 Surabaya. Jurnal Pendidikan Teknik Elektro, 8(1).

Haristah, H., Azka, A., Setyawati, R. D., & Albab, I. U. (2019). Pengembangan Modul Pembelajaran. 1(5), 224–236.

Ilmiah, J., & Guru, P. (2024). Pengembangan Modul Praktikum Rangkaian Listrik untuk Meningkatkan Scientific Writing Skills Mahasiswa Teknik Elektro Development of an Electric Circuit Practical Module to Improve the Scientific. 5(1), 76–89.

Jusuf, H., Sobari, A., Teknik, F., Nasional, U., Hukum, I., Hukum, F., & Nasional, U. (2021). JAM-TEKNO Pelatihan Pembuatan Modul Pembelajaran Untuk Mendukung. 2(1), 33–37.

Mochammad Ardiansyah Sunarko, & Joko Joko. (2023). Pengembangan Experiment Sheet Instalasi Penerangan Listrik Berbasis Problem Based Learning Kelas XI Jurusan TITL Di SMK Negeri 7 Surabaya. Jurnal Elektronika Dan Teknik Informatika Terapan (JENTIK), 1(3), 263–282. https://doi.org/10.59061/jentik.v1i3.410

Muhammad Basir, H., & Pd, M. (2017). Pendekatan Pembelajaran LAMPENA INTIMEDIA. In Buku (Issue 010).

Nengsih, D., & Febrina, W. (2021). Pegembangan modul ajar kurikulum merdeka. *Jurnal manajemen pendidikan dan pelatihan*, *8*(1), 150-158.

Prabowo, C. A., Saptasari, M., Biologi, P., & Malang, P. N. (2016). Pengembangan Modul Pembelajaran Inkuiri Berbasis Laboratorium Virtual. 1090–1097.

Sujarwo, Abdul Hakim Yassi, Herawaty Abbas, & Harlinah sahib. (2024). An Interactive-Based E-Module of Translation Technology of Blended and Online Learning to Improve Autonomous Learning. The Seyreport Journal (TSRJ), 19(06), 193–209. https://doi.org/10.5281/ZENODO.11547317

Sumarmi, S., Bachri, S., Irawan, L. Y., & Aliman, M. (2021). E-module in Blended Learning: Its Impact on Students' Disaster Preparedness and Innovation in Developing Learning Media. International Journal of Instruction, 14(4), 187–208. https://doi.org/10.29333/iji.2021.14412a

Suparyanto dan Rosad (2015. (2020). Pengaruh Ketrampilan Pengelolaan Kelas terhadap Motivasi Belajar Siswa pada Mata Pelajaran PAI di SMP N 1 Kendal. Suparyanto Dan Rosad (2015, 5(3), 248–253.

Suryana, C., Nurwahidah, I., & Hernawan, A. H. (2022). Komparasi implementasi kurikulum 2013 dan kurikulum merdeka di sekolah dasar Kabupaten Garut. Jurnal basicedu. 6(4), 5877–5889.