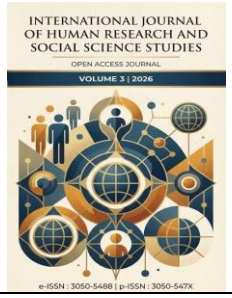
International Journal of Human Research and Social Science Studies

ISSN(p): 3050-547X, ISSN(e): 3050-5488

Volume 03 Issue 05 May, 2026

DOI: https://doi.org/10.55677/ijhrsss/03-2026-Vol03I05

Page No : 341-345



Needs Analysis for Web-Based E-Learning Development in The Electric Motor Installation Course in Vocational High Schools

Arief Rachman[1], Anna Cesaria[2], Radhya Yusri[3]

[1,2,3]Master of Vocational Teacher Education, PGRI University of West Sumatra, Padang City, Indonesia

ABSTRACT: This study aims to analyze the needs (need assessment) in the development of web-based e-learning in the subject of Electric Motor Installation at SMK Negeri 1 Tanjung Raya. The background of this study is based on the demands of 21st-century learning that requires the integration of technology in the learning process, as well as the characteristics of vocational high school students who tend to be more interested in digital, visual, and interactive media. This research method uses a needs analysis design with a mixed methods approach, this approach combines quantitative and qualitative data. Data collection techniques use questionnaires and interview sheets. Needs analysis is carried out on aspects of student characteristics based on learning styles, learning methods, learning environments, interests and learning motivations. The results of teacher interviews also show that teachers experience obstacles in presenting materials in an interesting and interactive way, and require learning media that can support independent learning, are flexible, and easily accessible to students at any time. In addition, supporting facilities such as internet access and digital devices are already sufficiently available, but have not been utilized optimally. This study also suggests the importance of increasing access to training for teachers in the utilization and development of e-learning media so that its implementation can run optimally and sustainably. The e-learning developed is expected to accommodate the needs of students and teachers through the presentation of interactive, multimedia-based materials, and support independent and collaborative learning.

Corresponding Author:

Anna Cesaria

Published Online:
May 11, 2026

KEYWORDS:
needs analysis, e-learning, electric motor installation, vocational school

Cite the Article: *Rachman, A.,Cesaria, A.,Yusri, R. (2026). Needs Analysis for Web-Based E-Learning Development in The Electric Motor Installation Course in Vocational High Schools. International Journal of Human Research and Social Science Studies,3(5),341-345. https://doi.org/10.55677/ijhrsss/03-2026-Vol03I05*

INTRODUCTION

Educational transformation in the digital era demands that the world of education adapt to advances in information and communication technology (ICT). The development of web-based technology provides significant opportunities for educational institutions to create more flexible and interactive learning systems [1]. One concrete implementation of this technology is the use of web-based e-learning, which allows the learning process to take place not only in the classroom but also online anytime and anywhere [2]. This is in line with the statement [3] that digital transformation in education is crucial for expanding access, improving quality, and ensuring global inclusiveness of learning. Vocational education, including Vocational High Schools (SMK), is a level of education that plays a strategic role in preparing skilled human resources who are ready to work and able to adapt to the development of industry 4.0 [4]. Therefore, the learning process in SMK still faces various obstacles, such as limited practical time, lack of facilities, and differences in students' abilities in understanding abstract material. The subject of Electric Motor Installation Phase F is a core competency in the Electrical Engineering expertise program at SMK. This subject requires students not only to understand the concept of electricity but also to be able to apply it in the form of direct practice such as installing, controlling and testing single-phase and three-phase electric motors according to industry standards.

Based on observations at SMK Negeri 1 Tanjung Raya in March 2026, the learning process was still dominated by theoretical explanations and manual demonstrations in the workshop. This caused some students to experience difficulties in understanding the working sequence of circuits and the principles of electromagnetic control. In addition, limited practice time and the availability of tools that were not commensurate with the number of students made learning less than optimal. These conditions encouraged the need to develop learning innovations that could bridge these limitations. One solution is to develop web-based e-learning that can provide theoretical materials, circuit simulations and performance-based assessments in one platform. This system allows students to learn independently, conduct virtual simulations, and receive feedback from their learning activities [5]. To achieve these goals, teachers are required to continuously improve their professionalism with the principles stipulated by law. For learning to be carried out in accordance with national education goals, active and innovative learning models are needed. Creative and innovative learning needs to be implemented by teachers in an effort to produce creative students, one of which is using e-learning. By implementing e-learning, learning can change from teacher-centered to digital-centered learning. A teacher must innovate and make changes by creating a learning environment that can increase students' independence in seeking knowledge so that problems in learning can be solved [6].

Several previous studies have demonstrated the effectiveness of web-based e-learning in improving vocational high school students' learning outcomes. Research by [7] shows that web-based learning improves students' conceptual understanding and learning motivation in electrical power installation competencies. However, most of the systems developed are still general and have not integrated interactive simulations specifically for learning Electric Motor Installation Phase F. Recent research [8] shows that the use of e-learning, including e-modules and Learning Management Systems (LMS), can improve the quality of learning and student learning outcomes in vocational high schools, although there are still challenges in its implementation such as limited infrastructure and teacher readiness. The use of e-learning in Vocational High Schools (SMK) is increasing along with the rapid development of educational technology innovation [9].

The development of e-learning is expected to not only be an additional learning medium, but also function as a learning ecosystem that supports project-based learning and performance assessment according to the characteristics of vocational education. The use of media in learning is very helpful in learning activities as expressed by [10] the function of learning media is as a teaching aid and helps so that teaching materials can be understood by students. This research has a real contribution in improving the quality of learning in vocational schools and supports the digitalization policy of vocational education initiated by the Ministry of Education, Culture, Research and Technology [11].

On the other hand, the characteristics of today's students show a strong tendency towards the use of digital technology in everyday life. Students are more interested in visual, interactive, and experience-based learning, thus requiring learning innovations that can accommodate these needs. E-learning designed with the right approach can be a solution to increase learning motivation, student engagement, and the achievement of expected competencies, especially in practical subjects such as Electric Motor Installation. The development of collaborative and interactive e-learning has also been proven to improve the quality of learning in vocational schools by integrating practical activities and discussions digitally [12].

However, effective e-learning development cannot be achieved without a solid foundation. One of the crucial stages in development research is a needs assessment, which aims to identify gaps between current and desired learning conditions. Needs analysis is a crucial initial step to ensure that the developed e-learning product truly aligns with student characteristics, teacher needs, and the learning context in vocational schools. Without a comprehensive needs analysis, e-learning development has the potential to be off-target and less than optimal in improving learning quality.

Based on the description, it can be concluded that the development of web-based e-learning for the Electrical Motor Installation subject requires an in-depth initial study through needs analysis. This study aims to analyze the needs for web-based e-learning development, including current learning conditions, student characteristics based on learning styles, learning methods, learning environments, interests and learning motivations. The results of this study are expected to serve as a basis for designing e-learning that is effective, interactive, and in accordance with the learning demands in vocational schools.

RESEARCH METHODS

This study uses a needs analysis design with a mixed methods approach. This approach combines quantitative and qualitative data sequentially, where quantitative data is collected first through a questionnaire to identify needs trends, then deepened through qualitative data in the form of interviews. This approach was chosen because needs analysis in e-learning development requires not only numerical data, but also contextual understanding related to learning conditions, student characteristics, and the readiness of the school environment. The study was conducted at SMK Negeri 1 Tanjung Raya, in the Electrical Power Installation Engineering (TITL) concentration, specifically in the Electric Motor Installation subject. The population in this study were all grade XI TITL students and Electric Motor Installation subject teachers. The sampling technique used purposive sampling, with the consideration that the selected subjects have a direct relationship with the use and needs of e-learning. The research sample consisted of 2 Electric Motor Installation subject teachers and 30 grade XI TITL students. Data collection was carried out through two instruments, namely questionnaires and interviews. Questionnaires were used to collect

quantitative data on needs analysis and student characteristics, while interviews aimed to gain deeper insight into the experiences and challenges faced by students in learning. Data validity was maintained through data triangulation and cross-checking of interviews. This study also adhered to research ethics, including obtaining informed consent from respondents and maintaining data confidentiality. The results are expected to provide a comprehensive picture of student needs and characteristics, as well as the challenges they face in improving learning outcomes.

RESULTS AND DISCUSSION

The respondents in this study consisted of 30 11th-grade students of the TITL program and 2 teachers of the Electrical Motor Installation subject at SMK Negeri 1 Tanjung Raya. Analyzing e-learning development needs cannot be separated from understanding the characteristics of students as the primary users. Therefore, this study examines aspects of learning styles, learning methods, learning environments, as well as student interests and motivations. The data were obtained through questionnaires and supported by interviews with students and teachers.

This study used a questionnaire conducted in March 2026. The results of the analysis of student characteristics are presented in the table below.

Table 1. Results of Analysis of Student Characteristics Based on Learning Styles

No	Indicator	Percentage	Category
1	Visual (learning through pictures/videos)	68%	High
2	Auditory (hearing explanations)	21%	Very low
3	Kinesthetic (hands-on practice)	74%	High
4	Combination (visual + practical)	82%	High

Based on the table of results of the analysis of student characteristics based on learning styles, students' learning styles are dominated by visual and kinesthetic, so learning must integrate videos, simulations, and direct practice.

Table 2. Results of Student Characteristics Analysis Based on Learning Methods

No	Indicator	Percentage	Category
1	Demonstration/hands-on practice	74%	Liked
2	Learning videos	90%	Very Liked
3	Group discussion	69%	Liked
4	Lecture	35%	Less Liked
5	Interactive simulation	91%	Very Liked

Based on the table of results of the analysis of student characteristics based on learning methods, the most effective learning methods are simulations, videos, and direct practice, not conventional lectures.

Table 3. Results of Student Characteristics Analysis Based on Learning Environment

No	Indicator	Percentage	Category
1	Studying at school (class/lab)	78%	High
2	Study at home	65%	Medium
3	Learn to use a cell phone	90%	Very high
4	Learning through social media/YouTube	81%	High

Based on the table showing the results of the analysis of student characteristics based on their learning environment, the students' learning environment supports digital learning, particularly through mobile devices.

Table 4. Results of Student Characteristics Analysis Based on Learning Interests

No	Indicator	Percentage	Category
1	Interest in electric motor material	78%	High
2	Interest in technology-based learning	92%	Very high
3	Interest in videos/simulations	90%	Very high
4	Interest in reading text modules	51%	Low

Based on the table of results of the analysis of student characteristics based on learning interests, students have high interest in technology-based learning, especially visual media.

Table 5. Results of Student Characteristics Analysis Based on Learning Motivation

No	Indicator	Percentage	Category
1	Motivated by using interesting media	90%	Very high
2	Study for job skills	82%	High
3	Independent study outside school hours	67%	Medium
4	Consistency of learning	64%	Medium

Based on the table of results of the analysis of student characteristics based on learning motivation, student learning motivation can be increased through interactive media and learning flexibility.

To strengthen the results of the questionnaire above, interviews were conducted with several teachers who teach electric motor installation. The teachers interviewed revealed that learning electric motor installation still predominantly uses lectures and limited demonstrations. Limited time for practice is a major obstacle. Not all students can understand the material in a single explanation. Teachers need learning media that students can access outside of school hours. One teacher said, *"Students often forget practical steps, so having re-accessible resources like videos or simulations is incredibly helpful. Practical time is limited, so not all students can fully utilize the experience. With e-learning, students can study before and after the practical."*

The teacher's expectations in the interview, the teacher hopes *"The use of learning media can increase student activity, interest, and motivation to learn. Given the characteristics of vocational high school students who tend to prefer visual and activity-based learning, engaging and interactive media is expected to engage students more in the learning process, both individually and in groups"*. Other teachers also hope *"The use of learning media in the form of digital modules, practical videos, circuit simulations, and e-learning can facilitate the understanding of technical concepts and procedures. Complex electric motor installation materials such as Forward-Reverse, Star-Delta circuits, as well as single-phase and three-phase motor control are expected to be presented visually and systematically so that students can more easily understand the workflow before practicing directly in the workshop"*.

The main challenge faced by teachers is limited facilities and infrastructure. Not all schools have adequate facilities such as computers, stable internet connections, projectors, or access to optimal e-learning platforms. This situation prevents the optimal and equitable utilization of learning media in every session. Furthermore, teachers also face challenges in mastering technology and developing learning media. Not all teachers have sufficient skills in designing or using digital-based media such as circuit simulations, learning videos, or Learning Management Systems (LMS). The process of creating quality media also requires time, creativity, and ongoing training. Another challenge is adapting learning media to student characteristics. Vocational high school students have diverse abilities, so teachers need to design media that is not only engaging but also easy to understand for all ability levels. Furthermore, not all students have a high motivation for independent learning, so the use of digital media is sometimes not optimally utilized by students.

In addition to teachers, students were also important subjects in data collection through interviews regarding the implementation of learning media for electric motor installation and its use in the learning process at school. These interviews aimed to obtain a more comprehensive picture of students' learning experiences, their perceptions of media use, and its impact on their understanding and skills. Based on the interview results, the majority of students stated that *"The use of learning media such as practical videos, circuit animations, digital modules, and e-learning platforms really helps them understand technical and complex material. Students feel that the visualizations presented through these media make it easier for them to understand the workflow of electric motor installation, starting from the introduction of components, working principles, to the steps for installing the circuit." In addition, students also said that "if there is a video or simulation, we can watch it repeatedly, so we understand better than if it is only explained once. If it is only explained on the board, we quickly forget. Especially if we haven't had the chance to practice. It's better if there is a video, we can replay it at home*".

However, several students also expressed challenges in utilizing learning media, such as limited internet access, inadequate devices, and some students' unfamiliarity with independent learning through digital platforms. Therefore, students hoped for school support in the form of more adequate facilities and guidance from teachers in maximizing the use of learning media. Overall, interview results indicated that students had a positive perception of the implementation of learning media for electric motor installation. They hoped that the use of these media could continue to be developed and integrated with hands-on practice in the workshop, thereby improving their conceptual understanding, job skills, and readiness for the industrial world.

CONCLUSION

Based on the needs analysis, it can be concluded that the development of web-based e-learning for the Electrical Motor Installation subject in Vocational High Schools is highly necessary. This is demonstrated by the high level of student demand for digital learning media, which has reached the "high demand" category, particularly in the form of learning videos, interactive simulations, and online quizzes.

The characteristics of vocational high school students, who tend to prefer visual, hands-on, and flexible learning, further reinforce the urgency of developing e-learning that can accommodate these needs. Furthermore, students' relatively good technological readiness, indicated by device ownership and basic technology skills, is a supporting factor in the implementation of web-based e-learning.

Interviews with teachers and students also revealed limitations in conventional learning, particularly in terms of practice time and understanding procedural material. Therefore, web-based e-learning can be an effective solution to support more interactive, independent, and accessible learning. Therefore, the development of web-based e-learning for the Electrical Motor Installation subject is not only relevant to the needs of students and teachers but also has the potential to improve the quality of learning processes and outcomes in Vocational High Schools.

REFERENCES

1. Munir. (2020). Pembelajaran Digital: Teori dan Praktek dalam Dunia Pendidikan. Alfabeta.
2. Siemens, G. (2025). *Connectivism: A Learning Theory for the Digital Age. International Journal of Instructional Technology and Distance Learning*.
3. UNESCO. (2023). *Technology in Education: A Tool on The Road to 2030.* Unesco *Publishing*
4. Direktorat Jendral Vokasi. (2021). Strategi Transformasi Pendidikan Vokasi di Era Industri 4.0. Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi.
5. Branch, R.M. (2009). *Instructional Design: The ADDIE Approach*. Springer.
6. R Yusri, N Nurmi & H Delyana Development of ICT Integrated Project Vased Learning Student Worksheet, IoP Conf : Series Journal of Physics : Conference Series 1157(2019)032127
7. Purba, S. & Siregar, R. (2020). Pengembangan Media Pembelajaran Berbasis Web pada Kompetensi Teknik Instalasi Tenaga Listrik di SMK Negeri 2 Pematangsiantar. Jurnal Teknologi dan Pendidikan Vokasional, Vol. 5, No. 2.
8. Agustian, D., et al. (2024). The Role of E-Module in the Teaching and Learning Process in Vocational Secondary Schools.
9. Mudarta, I. M., Suryani, N., & Prasetyo, Z. K. (2025). Trends in e-learning usage in vocational high schools (SMK). *Journal of Technical Education and Training*, 17(1), 25–37.
10. Yusri, R., Husaini, A. (2017). Pengembangan Multimedia Interaktif Menggunakan Microsoft Power Point Dalam Pembelajaran Matematika Kelas X SMA Muhammadiyah Padang Panjang. Jurnal Ipteks Terapan, 11(1), 1. https://doi.org/10.22216/jit.v11i1.1648
11. Kemendikbudristek. (2023). Kebijakan Merdeka Belajar dan Transformasi Digital Pendidikan Vokasi.
12. Kurnaedi, D., & Widyarto, S. (2024). Collaborative E-Learning Model Development for Vocational Schools.