Circuit: Jurnal Ilmiah Pendidikan Teknik Elektro
Volume 9 No. 2 March 2025 - August 2025
ISSN: 2549-3698; E-ISSN: 2549-3701
DOI: 10.22373/crc.v9i2.30462

Analysis of Student Interest in Using PSIM Trainers and Applications in Power Electronics Courses

Marda Assyifa[a], Hari Anna Lastya[a]

[a]Universitas Islam Negeri Ar-Raniry Banda Aceh, Indonesia

E-mail: 210211033@student.ar-raniry.ac.id

Submitted: 22-05-2025 Accepted: 30-07-2025 Published: 29-09-2025

Abstract

Practicum in power electronics course is one of the courses that has an important role in understanding the basics of electrical energy conversion systems, and the use of educational technology based on teaching aids in the form of trainers and PSIM applications to improve students' understanding of the concepts taught. This study aims to determine the extent to which students are interested and feel helped by the use of trainers and PSIM applications in Power Electronics courses. The researcher used a qualitative method with a descriptive type. This study used an interview instrument. The subjects of this study were students of the Electrical Engineering Education study program at UIN Ar-Raniry Banda Aceh who had taken the Power Electronics course, totaling 10 people. The results of the study showed that there was a comparison of the interests of Electrical Engineering Education students, namely out of 10 students, 7 of them were interested in using trainers and 3 of them were interested in PSIM application software. So from this study it was found that Electrical Engineering Education students were more interested in using trainers than PSIM application software in the Power Electronics course.

Keywords*: Interests, Trainer, PSIM Application, Power electronics.*

Abstrak

Praktikum pada mata kuliah elektronika daya adalah salah satu mata kuliah yang memiliki peran penting dalam memahami dasat-dasar sistem konversi energi listrik, dan penggunaan teknologi pendidikan berbasis alat peraga berupa *trainer* dan aplikasi PSIM untuk meningkatkan pemahaman mahasiswa terhadap konsep-konsep yang diajarkan. Penelitian ini bertujuan untuk mengetahui sejauh mana mahasiswa tertarik dan merasa terbantu dengan penggunaan *trainer* dan aplikasi PSIM pada mata kuliah Elektronika Daya. Peneliti menggunakan metode kualitatif dengan jenis deskriptif. Penelitian ini menggunakan instrumen wawancara. Subjek yang ditujukan pada penelitian ini adalah mahasiswa prodi Pendidikan Teknik Elektro UIN Ar-Raniry Banda Aceh yang sudah mengambil mata kuliah Elektronika Daya yang berjumlah 10 orang. Hasil penelitian menunjukkan bahwa adanya perbandingan dari minat mahasiswa Pendidikan Teknik Elektro yaitu dari 10 mahasiswa, 7 diantaranya berminat terhadap penggunaan *trainer* dan 3 diantaranya berminat pada *software* aplikasi PSIM. Sehingga dari penelitian ini didapatkan mahasiswa Pendidikan Teknik Elektro lebih tertarik menggunakan *trainer* dari pada *software* aplikasi PSIM pada mata kuliah Elektronika Daya.

Kata kunci: Daya Listrik 3 fasa, Sistem monitoring, Internet of Things

Introduction

Education is the primary foundation for developing individuals capable of understanding, acting, and contributing to the advancement of civilization in the future. In the context of national development, superior and educated human resources are the primary determinant of a nation's success. In the context of national development, superior and educated human resources are the primary determinant of Indonesia' success. Therefore, universities must prioritize holistic education that cultivates critical thinking, creativity, and problem-solving skills [1]. Universities, as institutions of higher learning, play a strategic role in developing students who are not only intellectually intelligent but also creative, innovative, and capable of solving various problems. Therefore, universities must be the main agents that facilitate the cultivation, because their initiatives play a key role in strengthening the innovation ecosystem on campus [2]. The learning process in universities is inseparable from the role of student motivation and interest in learning, which directly influence their academic achievement [3].

Interest in learning is a psychological factor that has a strong influence on the learning process. Interest in learning is one of the main factors in achieving learning goals, which encourages individuals to be able to focus and pay attention to carry out learning activities with enthusiasm [4]. When students are interested in a subject, they tend to be more active, enthusiastic, and participate fully in learning activities [5]. Conversely, a lack of interest can lead to low engagement in discussions, group assignments, and even decreased concentration in class. This is clearly seen in practical courses, where student activeness is highly correlated with their interest in the learning methods used. The results of previous research show that there is a significant positive relationship between learning interest and students' practical abilities in practical courses [6]. Therefore, it is important for instructors to create a learning environment that stimulates student interest through appropriate methodological approaches [7].

PSIM is a simulation software designed specifically for power electronics and electric motor control (motor drives). It was developed by Power Sim Inc [8]. In Power Electronics courses, two commonly used learning methods are simulation using PSIM software and the use of training aids. Based on previous observations, students are more accustomed to using PSIM than training aids. Through this PSIM software, students do not need to have difficulty finding tools or electrical components to make circuits, because this software already provides component icons to make circuits easily [9][10]. However, the use of training aids as practical tools is considered to directly improve conceptual understanding and technical skills [11]. Several previous studies have also shown that training aids have high feasibility as learning media. Many studies have shown that PSIM training aids have a high level of suitability as practical learning media because of their ability to provide concrete and interactive experiences for students [12]. Therefore, it is important to further examine how student interest in these two methods can influence their learning process, particularly in Power Electronics course practicums.

Method

In this study, the researcher used a qualitative research approach. Qualitative research is a type of research that uses descriptive data in the form of written or spoken

language from people and observable behavior. Data collection techniques in qualitative research include in-depth interviews, observation, and documentation analysis [13]. This type of research uses descriptive research [11]. Descriptive research is the collection of data to test hypotheses or answer questions about the current state of the research subject, including researching a group of people, an object, a situation, a system of thought or an event in the present with correct interpretation [14]. This research involves several steps that must be taken to formulate the problem and answer the research objectives.

In the preparation stage, the researcher read several literatures from journals, compared them with actual field conditions, identified problems, tested instruments and selected populations and samples. Then, in the research implementation stage, the process began with data collection conducted through interview instruments to obtain in-depth information from respondents [15]. Next, data collection was carried out systematically to ensure that all necessary information was collected properly and relevantly. Then, data analysis was carried out using qualitative methods to identify patterns and themes that emerged from the collected data. Finally, conclusions were drawn based on the results of the analysis, resulting in a comprehensive understanding of student interest in using PSIM trainers and applications in power electronics courses.

The location of this research will be carried out at Ar-Raniry State Islamic University Banda Aceh, Faculty of Tarbiyah and Teacher Training, Electrical Engineering Education Study Program, which includes classrooms for Power Electronics courses, an Electrical Laboratory equipped with trainers and PSIM application software.

The data collection instrument used in this study was an interview to facilitate data collection and analysis. Interviews allow researchers to obtain in-depth information directly from respondents through face-to-face question-and-answer sessions, enabling deeper exploration of experiences, perceptions, and behaviors that are relevant to the research objectives [16]. The interviews used in this study were structured interviews, a type of interview designed in detail by the researcher. An interview guide composed of open-ended and closed questions was developed based on the existing academic [17]. This research was conducted directly with students, with the researcher meeting with respondents face-to-face in the electrical laboratory.

The data analysis technique used in this study is qualitative analysis, as proposed by Miles and Hubberman, namely data collection, data reduction, data presentation, and drawing conclusions. The criteria used in checking the data or checking the validity of the data in this study is checking with credibility criteria. The concept of the Miles and Huberman method was proposed by Matthew B. Miles and A. Michael Huberman, who developed an interactive qualitative data analysis model that is popular among educational and social researchers [18]. Credibility is a criterion to fulfill that the collected data and information must contain truth value, which means that the results of qualitative research can be trusted by readers and can be accepted by respondents who provide information collected during the research.

Result and Discussion

The research data was obtained from interviews with 10 students taking the Power Electronics course. The interviews were conducted using open-ended questions aimed at

eliciting students' understanding and experiences with using the trainer, as well as their perceptions of the effectiveness of both media in aiding their understanding of the course material.

Table 1. Comparison Results in Using Trainers and PSIM Applications

No	Subject	Trainer Interest Results	PSIM Application Interest Results	Interest
1.	MF	This trainer influenced his learning motivation because he could directly practice it with his own hands. However, he lacked a thorough understanding of the material.	This PSIM application really influences his learning motivation, because he is very interested in learning this application and it is easier than the trainer.	PSIM Application
2.	AZ	It is better to be directly confronted with real tools in front of your eyes, because it will really help in understanding power electronics and being able to assemble them directly with the demonstration tools.	The PSIM application makes learning easier, but it requires specialized assistance, including assistance from a lecturer and dedicated guidance in understanding computers. Therefore, it's less helpful in practical work.	Trainer
3.	IM	The trainer influences learning motivation, because previously they did not know the trainer and had not studied him, but the trainer cannot be taken anywhere, cannot learn anytime and anywhere.	Very interested and enthusiastic in using the PSIM application during practical, and increasing curiosity about many things about the PSIM application, which can create unlimited circuits.	PSIM Application
4.	RZ	The trainer is very motivating in learning, with the trainer, a high level of curiosity arises regarding power electronics practical, and the trainer is very helpful in dealing with learning difficulties.	This PSIM application is easy to understand but there is less interest in the PSIM application, no curiosity arises in the practicum.	Trainer
5.	TAM	The trainer was able to make him enthusiastic and excited to learn, the presence of a trainer made it easier to understand power electronics practicals.	Less interested and passionate about using the PSIM application because it is not easy to understand and the computer is inadequate.	Trainer
6.	MZ	The trainer greatly influences learning motivation, which was initially just ordinary, but after getting to know the trainer, curiosity about the practical work arose, because the trainer was so easy to understand and use.	The PSIM application does not increase enthusiasm for learning, does not create interest in practical work and does not help with learning difficulties.	Trainer
7.	KA	Previously, I had known the trainer from SMK, and was interested again in learning after using the trainer again in the power electronics practicum, with the trainer I felt it was easier to understand power electronics, by using the trainer I	There is no motivation, because the PSIM application is not easy to understand and there is less interest because they are more interested in using a trainer, and it is less helpful in overcoming learning difficulties.	Trainer

		felt more interested and enthusiastic.		
8.	HF	The use of a trainer influences learning motivation because the learning process becomes real and interactive and students can immediately put into practice the theory they have learned.	PSIM helps by providing theories that are difficult to understand, but the PSIM application is less interesting because it doesn't actually play like a trainer.	Trainer
9.	FRM	The trainer influences learning motivation, and when using it, it is very efficient in practical, but there is no high level of curiosity towards the trainer.	Very motivated because this PSIM application plays with software, very interested in using this PSIM application because it uses a laptop directly	PSIM Application
10.	MY	Using a trainer can influence learning motivation by helping overcome obstacles and providing the support needed to achieve learning goals. Having a trainer can significantly improve learning.	The PSIM application can influence learning motivation and interest in learning it, but there are difficulties in understanding the features provided in the software application.	Trainer

Based on interviews with 10 students regarding their interest analysis, the use of trainers has a more positive impact on learning motivation. This is evident in the large number of students who feel more enthusiastic, understand the material more easily, and are more confident when using it. The results of this study are supported by other results which state that students become more enthusiastic and happy to participate in learning after the interactive method is applied, in contrast to before when they were often lazy [19]. Direct interaction with real-life props allows students to apply the theory they have learned directly. This makes learning more concrete, and students can overcome difficulties they encounter directly in the field.

Conclusion

The analysis results show that the majority of students are more interested in using trainers in their Power Electronics course. Seven out of 10 students stated that using trainers provides a more realistic and interactive learning experience, thereby increasing motivation, understanding of the material, and facilitating practice. Their educational background from vocational schools also supports their understanding of using these tools, which ultimately increases enthusiasm and engagement during the learning process.

In contrast, interest in the PSIM application is still relatively low, with only 3 out of 10 students showing interest. This finding is consistent with other studies that stated that students' interest in simulators such as PSIM is still "relatively low" even though their understanding increases but their interest in using the application is very low [20]. This is due to a lack of experience in using simulation software and difficulty in connecting simulation results to real-world practice. Although PSIM is quite easy to use, some students felt the need for additional guidance in understanding its features. Basically, PSIM is easy to use as a simulation medium for basic electronics material, but students need software-assisted demonstrations by lecturers to be optimal [21].

With a 7:3 interest ratio, it can be concluded that Electrical Engineering Education students prefer using trainers over PSIM applications to support their Power Electronics

learning.

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