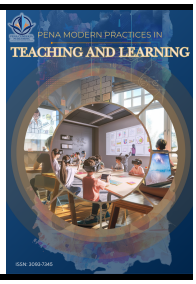
Pena Modern Practices in Teaching and Learning

Journal homepage:
https://penacendekia.com.my/index.php/pmptl/index
ISSN: 3093-7345



Effectiveness of the Innovative Product MyTableLab in Enhancing Student's Understanding and Interest in Teaching and Learning Sessions

Rasidah Rusman[1,*], Shudermawan Jaruman[1], Zulkifli Sarji[1]

[1] Department of Electrical Engineering, Politeknik Mersing, Johor, Malaysia

ARTICLE INFO

Article history:
Received 11 October 2025
Received in revised form 10 November 2025
Accepted 16 November 2025
Available online 21 November 2025

Keywords:
Semiconductor devices; teaching and learning tool; innovative product

ABSTRACT

This study examines the efficacy of MyTableLab, an innovative product that use as teaching and learning tool in improving students' comprehension of theoretical and practical concepts while stimulating their interest in teaching and learning sessions particularly within the domain of Semiconductor Devices subject's. This research employed a quantitative methodology including 80 students from Politeknik Mersing, who completed a structured questionnaire centered on two main objectives that are to assess the effectiveness of MyTableLab in improving students' understanding of the topics and second objectives are to evaluate the extent to which MyTableLab increases students' interest in teaching and learning sessions. The result has been analyse using SPSS and indicate that MyTableLab markedly enhances conceptual clarity and practical skills, while simultaneously cultivating enthusiasm and confidence in the practical work of the Semiconductor Devices subject.

1. Introduction

Educational innovations are essential for meeting the learning requirements of 21st-century students. MyTableLab is an innovative product intended to enhance both theoretical and practical education via visual circuit design. This report examines the efficacy of MyTableLab in enhancing students' comprehension of Semiconductor Devices and in augmenting their engagement during classroom sessions, especially in practical classes.

Students frequently have challenges in comprehending abstract concepts and applying theoretical knowledge to practical problems, particularly in technical disciplines such as Semiconductor Devices subject [1]. Conventional pedagogical approaches may fail to adequately engage students or connect theoretical concepts with practical application. There is a necessity for innovative product such as MyTableLab that employ visual methodologies to augment understanding and elevate student engagement [2]. In fact, Research by Aswin et al., [3] discusses an innovative workflow that enhances electronics education through augmented reality (AR) and automated circuit verification, addressing similar challenges faced in understanding abstract concepts. By integrating

* *Corresponding author.*
E-mail address: rasidah@tvet.pmj.edu.my

https://doi.org/10.37934/pmptl.3.1.1219

AR, students can visualize and interact with virtual elements, bridging theoretical knowledge and practical application. Singh [4] discusses the challenges students face in understanding solid state semiconductor devices, particularly due to difficulties with the atomic model and visualization of carriers. It introduces integrated learning with technology, which successfully reduced the failure rate in the course. Hence, Thomassian discusses the challenges students face in understanding electrical engineering concepts, particularly non-electrical engineering majors [5]. It emphasizes the need for innovative teaching methods, such as active and interactive learning techniques, to enhance comprehension and engagement. Nevertheless, its efficacy in enhancing learning outcomes has not been comprehensively assessed. This study aims to assess the impact of MyTableLab on students' understanding and interest during teaching and learning sessions.

2. Literature Review

According to Tan and Zulkifli, the incorporation of educational technology in classroom environments is recognized for its ability to enhance conceptual comprehension and student engagement. Visual and interactive aids are essential for aiding students in understanding intricate subjects, particularly in STEM disciplines [6]. MyTableLab, an innovation intended to facilitate practical and theoretical learning via visual circuit design, corresponds with these educational breakthroughs.

Ahmad and Halim assert that visual aids can substantially improve students' understanding of abstract scientific concepts. Their research indicated that students utilizing diagrammatic tools had enhanced academic performance and increased retention rates [7]. This discovery reinforces MyTableLab's aim to help students connect theoretical knowledge with practical applications.

Furthermore, Ismail and Nor discovered that the incorporation of interactive teaching aids enhances student motivation and engagement. Their research indicated that students were more inclined to participate in class and demonstrate passion for learning when utilizing tools that facilitate content delivery and task execution [8]. Hence, Huang found that educational technology can effectively engage students, making it a valuable tool for educators and policymakers aiming to improve student motivation and engagement in the learning process [9]. MyTableLab's design, which includes interactive visual simulations and streamlined circuit design processes, addresses this requirement by rendering practical work more accessible and less daunting.

Razak and Kamaruddin demonstrated that the visualization of circuit design enhances students' capacity to perform practical activities autonomously and with assurance. Their research indicated that visual tools enhanced comprehension and fostered problem-solving abilities in technical disciplines [10]. These findings closely correspond with the feedback from students who indicated enhanced efficiency and confidence in completing practical activities utilizing MyTableLab.

Alegre mentioned that the incorporation of educational technology significantly enhances student engagement and motivation in the learning process. The study revealed a strong positive correlation between classroom technology integration and both student engagement and motivation [11]. Students expressed positive attitudes towards technology use, acknowledging its beneficial impact on their knowledge, skills, and confidence. This highlights the importance of innovative technology in fostering an engaging learning environment, emphasizing the need for ongoing professional development for teachers to effectively integrate technology into their classrooms. Malik also found that technology-based education leads to increased student engagement, as it fosters interactive learning environments and improves teacher-student interactions [12]. Additionally, the use of technology motivates students by making learning more dynamic and

accessible, ultimately contributing to better academic achievement and knowledge retention. These findings highlight the importance of integrating technology to enhance educational outcomes.

Furthermore, Lee and Mohd Arif emphasized the importance of innovative design in educational technology, particularly in making content more relatable and engaging [14]. They advocated for the use of ICT-based teaching aids that combine aesthetics with function. Yu stated that the incorporation of educational technology significantly enhances student engagement and motivation by providing diverse tools and platforms that cater to various learning styles [15] which resonates with MyTableLab's approach in presenting neat, interactive, and efficient visual formats for circuit-related learning.

In summary, existing literature provides strong empirical support for the use of visual and interactive learning tools in enhancing both student understanding and interest. MyTableLab fits well within this framework, suggesting its relevance and potential impact in improving teaching and learning outcomes in technical subjects.

3. Methodology

This study utilized a quantitative methodology through a standardized questionnaire. A total of 80 students in Semiconductor Devices utilized MyTableLab during their practical class. The questionnaire was created in accordance with the two research objectives and had five Likert-scale items. The questionnaire comprises 5 items pertaining to student's comprehension at Section A and 4 items related to students' level of interest, motivation, and engagement at Section B.

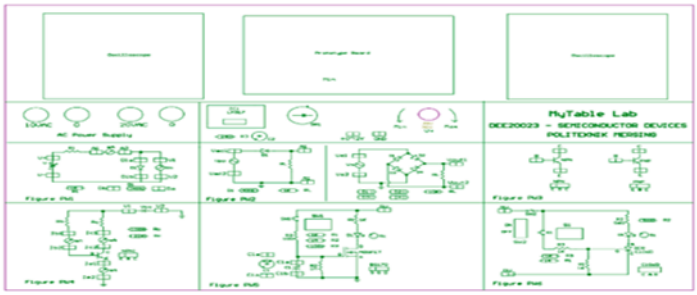


Fig. 1. PCB circuit design of MyTableLab's display

Fig. 2. MyTableLab, innovative product use as teaching and learning tool

3.1 Research Design

A descriptive survey design was used to measure students' perceptions of MyTableLab. This design is appropriate for studies aiming to describe phenomenon based on respondents' feedback. The study focused on two main objectives:

1) To assess the effectiveness of MyTableLab in improving students' understanding of the topics taught.

2) To evaluate the extent to which MyTableLab increases students' interest in teaching and learning sessions.

3.2 Respondent

The sample comprised 80 students enrolled in the Semiconductor Devices course who had experience using MyTableLab during their practical sessions. These students were selected using purposive sampling, as they had direct exposure to the innovative product. All participants were implementing MyTableLab in its practical teaching sessions.

3.3 Instrument

Data was collected using a structured questionnaire developed based on the study's two objectives. The questionnaire consisted of 9 items measured on a 5-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (5). The questionnaire is divided into two sections.

Section A discussed understanding assesing 5 items evaluated the extent to which MyTableLab enhanced students' comprehension of theoretical content and practical application. Section B discussed interest and engagement assessing on 4 items assessed the students' level of interest, motivation, and engagement when learning with MyTableLab.

4. Results and Discussion

Section A assessing on understanding containing 5 items evaluated the extent to which MyTableLab enhanced students' comprehension of theoretical content and practical application.

Table 3
Mean score at section A

Item	Question	Mean
1	I like using MyTableLab because it makes it easier to complete Practical Work both inside and outside the classroom	4.7625
2	I like using MyTableLab because it makes the process of assembling circuits easier both inside and outside the classroom.	4.7625
3	I can save time assembling circuits by using MyTableLab.	4.7625
4	My circuit arrangements are more accurate and neat when using MyTableLab.	4.75
5	The PCB circuit design on the MyTableLab display panel helps me better understand the Practical Work.	4.7625

The data from Section A, which assesses how MyTableLab enhances student's understanding of theoretical content and practical application, shows consistently high mean scores across all five items. This indicates a strong positive perception of MyTableLab's effectiveness among the students.

Items 1, 2, 3, and 5 each received a mean score of 4.7625, reflecting that students strongly agree MyTableLab facilitates completing practical work, simplifies circuit assembly, saves time, and aids comprehension through its PCB circuit design display.

Item 4, regarding the accuracy and neatness of circuit arrangements when using MyTableLab, also scored highly with a mean of 4.75, indicating that students find the tool helps improve the quality of their circuit layouts.

This data shows that MyTableLab significantly enhances students' comprehension and practical skills related to circuit assembly and design. MyTableLab completed with 20VAC , 10VAC, 12VDC, breadboard, 2 pcs of Oscilloscopes. The PCB display has been divided into 6 division referring to one practical work per division. For example, in Practical Work 1 as shown at Figure 3, the objectives are to find forward current (IF) when diode in forward bias condition and to find reverse current (IR) when diode in reverse bias condition. At the MyTableLab display, the circuit has been assembled. The student only needs to connect the VDC supply located at the top of the MyTableLab to the assembled circuit according to the lab sheet to get the current reading. It shows that MyTableLab facilitates in completing practical work for student in the classroom yet out of classroom as MyTableLab combined all the instrument's required to complete the practical work.

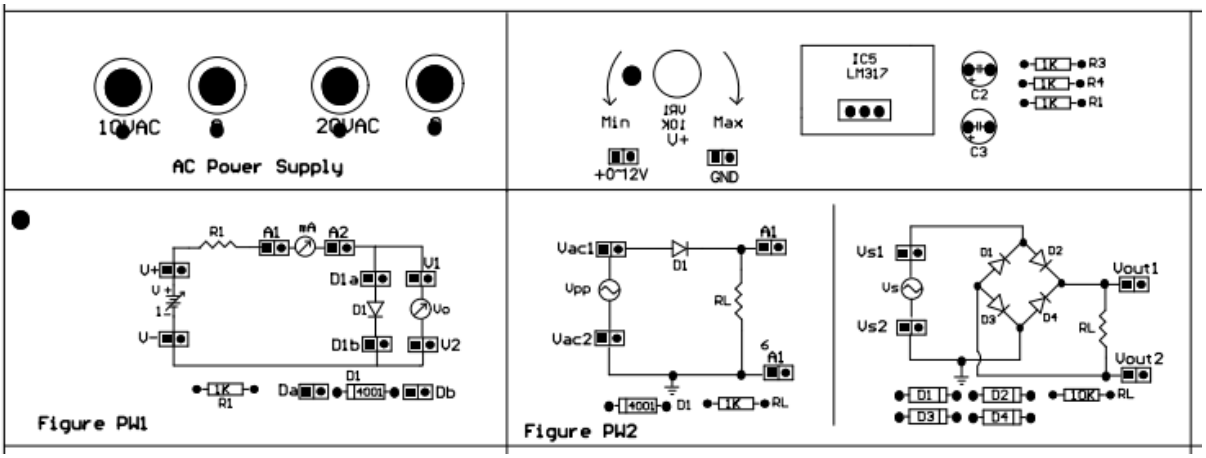


Fig. 3. Snapshot of MyTableLab's display focusing on Practical Work 1

Overall, the consistently high means near the maximum score of 5 demonstrate that students value the tool for both theoretical understanding and practical application, aligning with previous observations of its user-friendly interface and effectiveness in circuit assembly tasks.

Section B assessing on interest and engagement containg 4 items assessed the students' level of interest, motivation, and engagement when learning with MyTableLab.

Table 4
Mean score at Section B

Item	Question	Mean
1	I'm more understand the theory taught in practical classes when using MyTableLab.	4.725
2	I can relate what I learned in theory classes to the practical learning using MyTableLab.	4.6625
3	I successfully complete Semiconductor's Practical Work better after using MyTableLab.	4.725
4	I am more confident in doing Practical Work after using MyTableLab.	4.7125

The data reflects students' perceptions of how MyTableLab supports their understanding of theory and practical skills in semiconductor practical work, with all mean scores above 4.6 on a 5-point scale, indicating strong agreement.

Item 1 shows a mean of 4.725, suggesting that students feel they better understand the theory taught in practical classes when using MyTableLab.

Item 2, with a mean of 4.6625, indicates that students can effectively relate theoretical knowledge to practical learning through MyTableLab.

Item 3 also scored 4.725, reflecting students' belief that they complete semiconductor practical work more successfully after using the tool.

Item 4, with a mean of 4.7125, shows increased confidence among students in performing practical work following their use of MyTableLab.

The PCB display at MyTableLab play important role in enhancing student comprehension. For example, in Practical work 3 , the objective of the practical work is to identify terminal of Bipolar Junction Transistor that are Collector, Base and Emitter as shown in Figure 4.. As MyTableLab completed with Diode Mode, similar mode that external multimeter has to identify BJT terminal. So, student only need to assemble the BJT pin to the display to identify the terminal. In conjunction increase student's confidence in completing practical tasks as MyTableLab equipped with all the instruments.

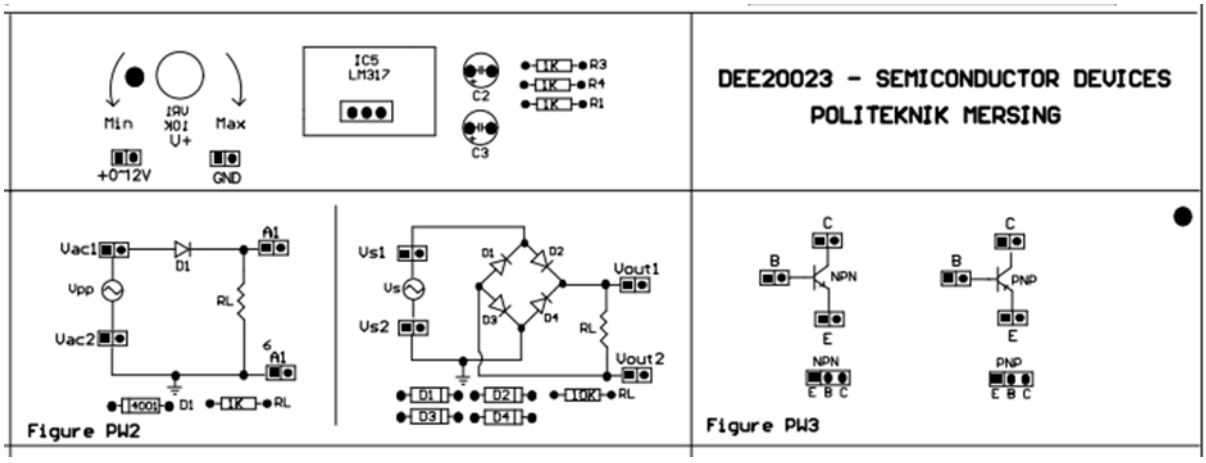


Fig. 4. Snapshot of MyTableLab's display focusing on Practical Work 3

Overall, these results demonstrate that MyTableLab significantly enhances students' comprehension of theoretical concepts, their ability to apply these concepts practically, and their confidence in completing practical tasks. This aligns with previous findings that MyTableLab effectively facilitates learning and circuit assembly processes.

5. Conclusion

This study's findings underscore MyTableLab's potential as a significant educational innovation in the instruction of technical disciplines, especially Semiconductor Devices. The technology adeptly connects theoretical knowledge with practical application by providing an interactive and visual learning environment. Students indicated markedly improved understanding of the subjects presented, particularly in domains that generally encompass abstract and intricate concepts, such as circuit design.

Furthermore, the tool has demonstrated significant promise in augmenting students' interest and drive. Students demonstrated increased enthusiasm, confidence, and satisfaction when engaging in practical work with MyTableLab. The capacity to graphically model circuits and engage with the material both within and beyond the classroom empowered students to assume greater responsibility for their learning, resulting in a more significant educational experience.

These results correspond with contemporary educational objectives that prioritise active learning, student involvement, and the incorporation of technology in classroom teaching. The efficacy of MyTableLab in facilitating both cognitive and emotive learning domains indicates that it serves as an effective pedagogical tool and a catalyst for transformative change in engineering education.

In summary, the incorporation of MyTableLab in both practical and theoretical instruction is strongly advised. Its application can cultivate a profound understanding, promote autonomous learning, and enhance student engagement in technical disciplines—ultimately leading to improved academic outcomes and preparedness for future technological challenges.

Acknowledgement
This research was not funded by any grant.

References

[1] Maiti, Chinmay K., and Ananda Maiti. "Enhancing microelectronics education using online semiconductor technology CAD laboratory." In *2013 IEEE Frontiers in Education Conference (FIE)*, pp. 866-871. IEEE, 2013. https://doi.org/10.1109/FIE.2013.6684948

[2] Doering, Edward R. "Scientific visualization in the circuits curriculum: enhancing student insight." In *Proceedings Frontiers in Education 1995 25th Annual Conference. Engineering Education for the 21st Century*, vol. 1, pp. 2c6-13. IEEE, 1995. https://doi.org/10.1109/FIE.1995.483087

[3] Aswin, A., S. M. Anzar, N. P. Subheesh, and Aby John. "Enhancing Electronics Education through Augmented Reality and Automated Circuit Verification: A Comprehensive Workflow Design." In *2024 IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE)*, pp. 1-8. IEEE, 2024. https://doi.org/10.1109/TALE62452.2024.10834354

[4] Singh, Ghanshyam Kumar. "Giving enhanced learning experiences through e-Learning on Solid State Semiconductor Devices course." In *25th AAOU Asian Association of Open Universities Annual Conference*, pp. 28-30. 2011.

[5] Thomassian, Jean-Claude, and Anoop Desai. "Interactive learning modules for innovative pedagogy in circuits and electronics." In *2008 38th Annual Frontiers in Education Conference*, pp. F2A-7. IEEE, 2008. IEEE. https://doi.org/10.1109/FIE.2008.4720462

[6] Ahmad, N., & Halim, L. (2021). Penggunaan alat bantu visual dalam meningkatkan pemahaman pelajar terhadap konsep sains. Jurnal Inovasi Pendidikan, 9(2), 33–41. https://jip.example.com/2021/visual-tools

[7] Alegre, Emybel M. "Technology-driven education: Analyzing the synergy among innovation, motivation, and student engagement." *International Journal of Membrane Science and Technology* 10, no. 2 (2023): 1477-1485. https://doi.org/10.15379/ijmst.v10i2.1507

[8] Chen, H., and Y. Huang. "The impact of digital learning platforms on student motivation in high school." *Journal of Education, Humanities and Social Sciences* 39, no. 4 (2024): 391-395. https://doi.org/10.54097/fab4wb46

[9] Ismail, R., & Nor, M. F. (2020). Kesan penggunaan bahan bantu mengajar interaktif terhadap minat pelajar sekolah menengah. Malaysian Journal of Learning and Instruction, 17(1), 89–102. https://mjli.example.edu.my/2020/interactive-teaching.

[10] Joshi, Ankur, Saket Kale, Satish Chandel, and D. Kumar Pal. "Likert scale: Explored and explained." *British journal of applied science & technology* 7, no. 4 (2015): 396. https://doi.org/10.9734/BJAST/2015/14975
[11] Lee, C. Y., & Mohd Arif, M. N. (2019). Reka bentuk inovatif dalam bahan bantu mengajar berasaskan ICT: Analisis keberkesanan. Jurnal Teknologi Pendidikan, 11(3), 112–125. https://jteknologi.edu.my/2019/ict-innovation
[12] Malik, Rashi. "Impact of technology-based education on student learning outcomes and engagement." In *2023 10th International Conference on Computing for Sustainable Global Development (INDIACom)*, pp. 784-788. IEEE, 2023.
[13] Razak, M. N., & Kamaruddin, S. (2023). Pendekatan visualisasi data dalam meningkatkan pencapaian akademik pelajar. ASEAN Journal of Education, 5(1), 15–26. https://aje.my/2023/data-visualization
[14] Tan, S. W., & Zulkifli, H. (2022). Persepsi pelajar terhadap penggunaan teknologi pendidikan dalam PdP. Jurnal Pendidikan Malaysia, 47(4), 201–215. https://jpm.upm.edu.my/2022/tech-in-pdp
[15] Yu, A. (2024). Empowering learning: A systematic review of technology use and motivation in education. Lecture Notes in Education Psychology and Public Media. https://doi.org/10.54254/2753-7048/45/20230363