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Development and Evaluation of a Rechargeable 12V A3 Technical Drafting Board

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Abstract. This This research aimed to develop and evaluate the 12V A3 Technical Drafting Board, with a primary focus on its applicability in technical drafting courses in the Philippines. Technical drafting education in the country emphasizes the acquisition of skills and knowledge necessary for generating precise drawings through the utilization of specialized tools and software. Employing a developmental research design within the IPO model framework, this study delineated a systematic roadmap for the various stages involved in the creation of the 12V A3 Technical Drafting Board. Feedback from the two groups of respondents attests to the effectiveness of the 12V A3 Technical Drafting Board in fulfilling its intended purpose. Expert evaluations highlight its high functionality, particularly praising its rechargeable feature and adjustable angles. Notably, the board's maintainability garnered positive remarks, emphasizing the ease of replacing electrical components readily available in the market. Evaluation results from both teachers and students collectively indicate overall satisfaction with the board's instructional utility.

Keywords: 12 Volts; A3 Size; Functionality; Maintainability; Technical Drafting Board

1. Introduction

Technical drafting is a crucial discipline in engineering and design, involving the creation of detailed technical drawings vital for various industries. Technical drafting courses provide skills and knowledge for producing precise drawings using specialized tools and software. The International Organization for Standardization (ISO) underscores the importance of technical drafting for global engineering standardization. In the Philippines, Technical Drafting NC II is a vocational program offered by TESDA, aiming to develop competencies for technical drafting. The program combines theoretical instruction, hands-on

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practice, and industry immersion, preparing graduates for roles like draftsmen and CAD operators.

The program emphasizes the use of drawing tools, including paper, pencils, rulers, and drafting software. A drawing board is highlighted as an essential tool, providing stability and control for accurate drawings. The study introduces an innovative drawing board with additional features such as LED lights, a battery management system, and a switch, aiming to bridge the existing innovation gap in drawing board technology. In the presented study, the researchers aim to fill the innovation gap by enhancing the existing drawing board prototype. They introduce features such as strip LED lights, powered by 18650 lithium-ion batteries connected through a battery management system (BMS). This addition allows for rechargeability and the capability to produce luminance. The 18650 lithium-ion battery, known for its compact size and high energy density, is safeguarded by the BMS, which monitors and controls charging, discharging, and overall battery management. To control the luminance of the LED lights, a double-pole double-throw switch (DPDT) is employed. This electrical switch provides multiple configurations, allowing for versatility in controlling the flow of electrical currents. Furthermore, a 12V DC female socket is integrated, providing a standardized method for connecting a compatible power plug or adapter. The addition of these features not only fills the innovation gap in the drawing board technology but also aligns with the advantages of LED strip lights, including energy efficiency, adjustable lighting parameters, long lifespan, and minimal heat output. The researchers' approach contributes to creating a drawing board that meets the evolving needs of designers, drafters, artists, and architects, enhancing precision and quality in their work.

The innovation gap, as defined by Schilling (2017), refers to the disparity between the current state of innovation in an industry or organization and its potential level. The researchers believe their proposed drawing board enhancements will improve precision and quality in the work of designers, drafters, artists, and architects. The concept of the innovation gap, as discussed by Schilling and Hill (1998), underscores the disparity between an organization's current level of innovation and its desired or potential level. Bridging this gap requires strategic efforts to drive sustained innovation. Factors contributing to the innovation gap include organizational culture, risk aversion, and insufficient

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resource allocation, highlighting the need to address these barriers for fostering a culture of innovation.

2. Methodology

This study utilized the developmental research design. According to Ulrich & Eppinger (2015), developmental research design in the context of product development refers to a systematic and iterative approach used to create, refine, and enhance products over time. The design process in product development that involves continuous cycles of prototyping, testing, and modification is a dynamic and iterative approach aimed at refining and optimizing a product to meet specified requirements and user needs. This iterative cycle is a fundamental aspect of the developmental research design applied in the field of product development.

The general objective of this research focused on the development and assessment of the 12V A3 Technical Drafting Board. Firstly, the investigation delved into the development process by employing the stages of the IPO Model. This involved determining the input factors such as the Technical Drafting Board Design, Tools and Materials, and Cost and Benefit Analysis. Subsequently, the process phase encompassed Product Development, Product Testing, Product Implementation, Product Evaluation, and Product Revision, with the goal of understanding the output generated by this development.

Additionally, the study sought answers to the second research question by examining the assessment of the 12V A3 Technical Drafting Board. Expert respondents played a crucial role in evaluating its technical specifications, focusing on functionality and maintainability. Simultaneously, students and teachers were engaged to assess the board's instructional use, providing insights into its effectiveness within an educational context. Through a comprehensive examination of both the developmental stages and the assessment criteria, the study aimed to contribute valuable insights into the creation and effectiveness of the 12V A3 Technical Drafting Board.

This study was conducted at the College of Industrial Technology of Nueva Ecija University of Science and Technology during the first semester of academic year 2023 – 2024.

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3. Results and Discussion

3.1. Development of the 12V A3 Technical Drafting Board according to the following stages of the IPO Model

The development of the 12V A3 Technical Drafting Board follows a structured approach based on the Input- Process-Output (IPO) model. This model serves as a framework for understanding the flow of information within a system and can be applied to the systematic development of a product. In this case, the IPO model provides a roadmap for the stages involved in developing the 12V A3 Technical Drafting Board, a portable and reliable tool designed to meet the needs of drafters, architects, engineers, and designers. By following the distinct stages of input, process, and output, the researchers gather user requirements, design, and prototype the board, and manufacture it to specifications.

3.1.1. Input

The input stage of the development is focused on designing the 12v A3 technical drafting board, identify and described the needed tools and materials, and the cost and benefit analysis.

Technical Drafting Board Design. Technical drafting board design refers to the process of creating a physical workspace specifically designed for technical drawing and drafting purposes. Technical drafting boards provide a stable and precise surface on which architects, engineers, designers, and drafters can create detailed and accurate drawings by hand or with the assistance of drafting tools. Figure 1 shows the 2d and 3d designs of the developed technical drafting board, while figure 2 shows the pictograph of the electrical connection.

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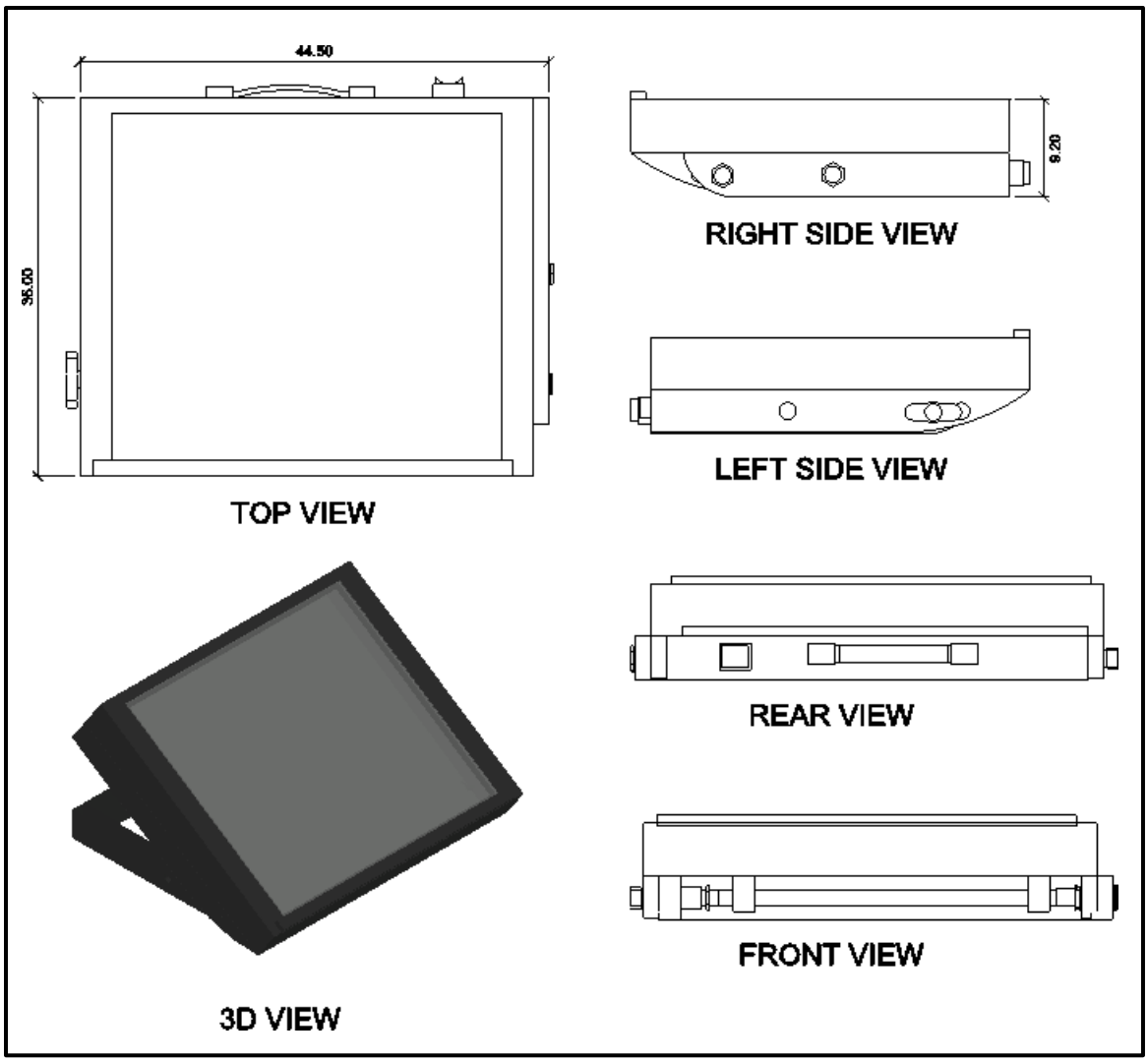

Figure 1 2d and 3d view of the Technical Drawing Board

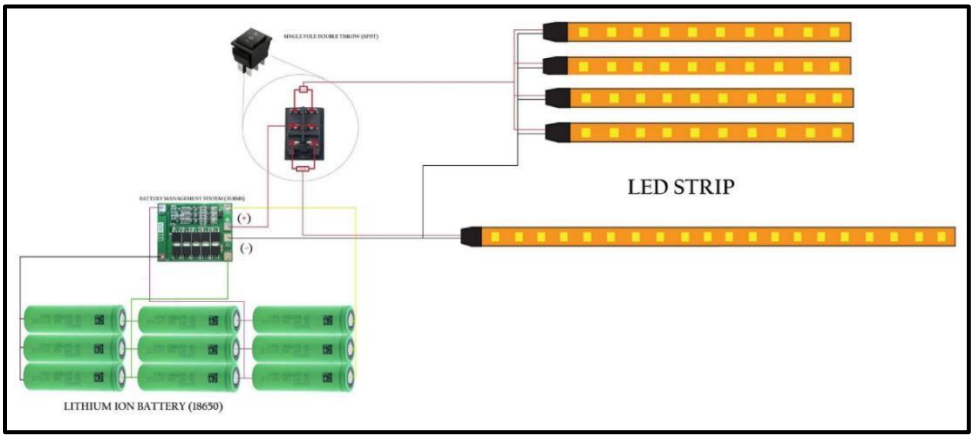

Figure 2 Electrical connection of the Technical Drawing Board

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Tools and Materials. Tools and materials play a crucial role in various fields and industries, enabling professionals to perform specific tasks efficiently and effectively. Tools are instruments or devices designed to carry out specific functions or tasks. They are utilized across different industries and disciplines to assist in various operations. Tools can be categorized into hand tools, power tools, cutting tools, measuring tools, diagnostic tools, and many more, depending on their specific application. Materials refer to substances or matter used to create or construct various products, structures, or components. They can be natural resources, such as wood, stone, or metals, or synthetic materials like plastics, composites, or fabrics. Figure 3 shows the different tools and materials used in the development of the 12v A3 technical drafting board.

Figure 3 Tools and materials used in the development of the Technical Drawing Board

Cost and Benefit Analysis. According to Boardman, Greenberg, Vining, & Weimer (2018), Cost and Benefit Analysis, also known as Cost- Benefit Analysis (CBA), is a systematic approach used to evaluate the costs and benefits of a proposed project, policy, or decision. It involves quantifying and comparing the positive outcomes (benefits) and negative impacts (costs) associated with different alternatives to determine their overall feasibility and desirability. CBA helps decision-makers assess the economic efficiency and net value of a project or policy by considering both monetary and non-monetary factors. Table 1 shows the total costing of the 12v A3 Technical Drafting Board.

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Table 1 Bills of Materials of the 12v A3 Technical Drafting Board

Quantity	Unit	Materials	Price
1	pc	1x2 ft White Acrylic Board 3.0mm	₱320.00
4	pcs	8" Strip LED Lights	₱380.00
1	pc	1 ft Strip LED Light	₱120.00
1	pc	18650 BMS PCM Protection Board	₱125.00
6	pcs	18650 Lithium-Ion Battery	₱120.00
2	mts	Speaker Wire	₱70.00
1	pc	Double Pole Double Throw Switch	₱45.00
4	Pcs	30x30 mm L Bracket	₱30.00
1	Pc	12V DC Female Socket	₱20.00
3	Cans	100 ml Spray Paint (Black, Gray, and Clear)	₱300.00
		Total	**₱1,530.00**

As shown in table 1, the cost and benefit analysis of the developed 12V A3 Technical Drafting Board in comparison to the Dolity Wood Drafting Table and the CHIPAL A3 Digital Graphics Tablet. For the cost analysis, the developed 12V A3 Technical Drafting Board is priced at ₱1,530.00, which is considerably lower than the combined price of the Dolity Wood Drafting Table (₱2,990.00) and the CHIPAL A3 Digital Graphics Tablet (₱3,148.69). From a cost perspective, the developed drafting board offers a more affordable option compared to the other two alternatives.

Furthermore, the benefit analysis of the developed 12V A3 Technical Drafting Board offers several benefits such as:

Stability: The drafting board is described as stable, which is crucial for technical drawing to ensure precise and accurate results.

Durability: The statement suggests that the developed drafting board is durable, implying that it can withstand regular use and last for a significant period.

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Portability: The developed drafting board is portable, allowing users to easily carry it and work in different locations. This mobility can be advantageous for professionals who require flexibility and the ability to work on- site or while traveling.

Recharge-ability: The drafting board operates on a 12V power source, indicating that it is rechargeable. This eliminates the need for frequent battery replacements and ensures continuous usage without interruptions.

Ease of use: The developed drafting board is described as easy to use, which implies that it has a user-friendly interface and straightforward operation, making it accessible to users with varying skill levels.

Light or Luminosity: The statement highlights that the developed drafting board has the capability to produce light or luminosity, which is deemed essential in technical drawing needs. This feature can provide enhanced visibility and clarity when working on detailed drawings.

3.1.2. Process

The process stage of the 12v A3 technical drafting board focused on the prototype's development, testing, implementation, evaluation, and revision.

Product Development. As defined, product development refers to the term used during the process of designing and creating the technical drafting board. A Gantt chart is a visual representation of a project schedule that illustrates the tasks, their durations, and the dependencies between them (Harrin, n.d.). It provides a timeline view of the project, allowing the researchers to understand the project's overall structure and track progress. Table 2 shows the Gannt chart of the development of the 12v A3 technical drafting board. Figure 4 shows some of the researcher's images taken during the development of the 12v A3 technical drafting board.

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Table 2 Gantt Chart of Development of the 12v A3 Technical Drafting Board

12V A3 Technical Drafting Board	Timeline				
	Jan	Feb	March	April	May
Development					
Testing					
Implementation					
Evaluation					
Revision					

Figure 4 Product Development of the Technical Drawing Board

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Product Testing. According to Ulrich and Eppinger (2015), product testing is a systematic process that involves evaluating various aspects of a product to ensure it meets specified requirements and standards. In the case of the developed technical drafting board, testing was conducted during the latter part of the development stage.

The purpose of product testing is to verify that the intended functionality and capabilities of the technical drafting board are working smoothly. It involves assessing the performance, functionality, quality, and other characteristics of the product. By conducting thorough testing, any potential issues or deficiencies can be identified and addressed before the product is released to use in practical applications of its intended users.

In the specific case of the developed technical drafting board, is the significance of testing the recharge- ability of the built-in battery. This suggests that the board incorporates a rechargeable power source, which is an important feature for a portable and convenient drawing tool. The testing of the recharge-ability would involve verifying that the battery performs as expected, holds a sufficient charge, and operates reliably over an acceptable period.

By conducting comprehensive product testing, the researchers can ensure that the technical drafting board meets the required standards, functions correctly, and satisfies user expectations. The testing stage helps the researchers identify any potential flaws, design issues, or performance limitations that may need to be addressed before the product is finalized. Ultimately, product testing plays a crucial role in ensuring the quality, functionality, and reliability of the technical drafting board.

The time it takes to charge an 18650 battery can vary depending on several factors, including the charger's specifications, the battery's capacity, and the charging current. Typically, a standard 18650 lithium-ion battery with a capacity of around 2500mAh (milliampere-hour) takes around 4-6 hours to charge fully using a dedicated charger. The charging time is influenced by the charging current, which is usually specified by the charger. Different chargers provide different charging currents, typically ranging from 0.5A to 2A or more. However, the lithium-ion batteries used in the technical drafting board are connected through 2P 3S, which means two (2) batteries has parallel connection and three (3) in series connection and it requires a power supply adapter that converts 240VAC to 12VDC to recharge. The built-in batteries can be fully-charged within one (1) hour and thirty (30) minutes.

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Product Implementation. This stage highlights the concept of product implementation, as defined by Hart and Fiegener (2018), within the context of the technical drafting board. Product implementation refers to the phase in the product development process where the designed and developed product is put into action and made available to customers or users.

In the case of the technical drafting board, implementation involved deploying the product to its intended users, which, in this case, were drafting students and teachers. This stage allowed the users to experience the product firsthand and evaluate its technical specifications and instructional capabilities in a real-world setting. The users could assess the board's maintainability, functionality, and performance in actual technical drawing scenarios.

The involvement of end – users in the implementation stage is crucial for the researchers to gain a deeper understanding of how the technical drafting board performs in practical situations. It allows them to identify any design flaws, usability issues, or areas where the product may fall short of user expectations. Further, product implementation is an essential phase in the product development process, as it enables the evaluation and validation of the technical drafting board's specifications and capabilities by its intended users. Figure 5shows some of the researcher's images taken during the implementation of the 12v A3 technical drafting board to its intended users.

Figure 5 Product Implementation of the Technical Drawing Board

Product Evaluation. Product evaluation is a systematic process that involves assessing and analyzing various aspects of a product to determine its performance, features, quality, and overall effectiveness (Cooper, 2019). In the

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case of the developed 12V A3 technical drafting board, its technical specifications and instructional capabilities were assessed by three different groups of respondents: experts, students, and teachers.

The expert respondents in the evaluation process played a crucial role in assessing the technical specifications of the drafting board. These experts likely possess specialized knowledge and experience in electronics and electrical equipment. Their expertise allows them to provide an informed assessment of the technical specifications and determine whether the drafting board meets the required standards and expectations.

On the other hand, the evaluation process also involved the participation of students and teachers. Students represent the end-users who will interact with the product on a regular basis. Teachers, as experienced professionals in the educational field, would have scrutinized the instructional capabilities of the 12V A3 technical drafting board. They would have assessed how effectively the board supports teaching and learning processes, its adaptability to different instructional methods, and the availability of instructional resources.

By involving these three groups of respondents in the evaluation process, a comprehensive assessment of the 12V A3 technical drafting board is obtained. The expert evaluation ensures that the technical specifications are up to standard, while the feedback from students and teachers provides insights into the user experience and instructional effectiveness. This holistic approach helps identify strengths, weaknesses, and areas for improvement, ultimately contributing to the overall quality and effectiveness of the 12V A3 technical drafting board. Figure 6 shows some of the researcher's images taken during the respondents' evaluation to the technical specifications and instructional use of the 12v A3 technical drafting board.

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Figure 6 Product Evaluation of the Technical Drawing Board

Product Revision. Product revision is a critical step in the product development process that involves making improvements and modifications to enhance the product's performance, features, and overall effectiveness. In the case of the 12V A3 technical drafting board, after conducting an evaluation on its technical specifications and instructional use, there are no minor or major comments or suggestions provided by the respondents, this implies that the developed product has been well received and meets the expectations of the end – users. Hence, while it is positive that no revisions were suggested after the evaluation process, the researchers should remain vigilant and open to potential improvements to maintain the product's competitiveness and meet the evolving needs of users.

3.1.3. Output

In the IPO model, the output is the result that is processed after taking input and performing the necessary processing. It represents the transformed form of the input data and is designed to fulfill the intended purpose of the product. The developed product is a specialized tool used by architects, engineers, and draftsmen for creating precise technical drawings and designs. It offers several features and benefits that contribute to its product output.

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Furthermore, the 12V A3 technical drafting board offers a range of features and benefits that contribute to its product output. Its size, adjustable working angle, parallel rulers, lighting system, and portability enhance productivity, accuracy, and convenience for professionals in technical drawing fields. By combining these features, the drafting board helps users produce high-quality and precise technical drawings. Figure 7 shows the final output of this study, the 12V A3 technical drafting board.

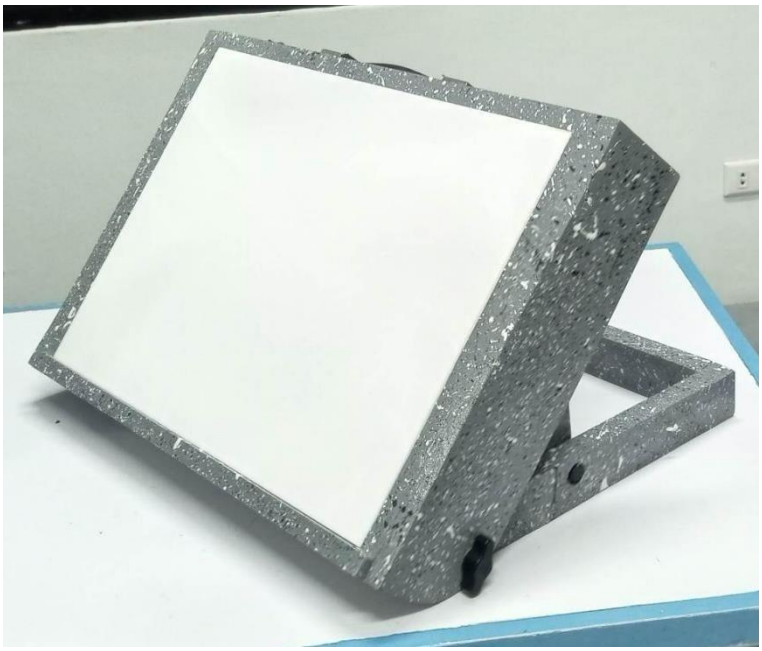

Figure 7 12V A3 Technical Drawing Board

3.2. Assessment of the 12V A3 Technical Drafting Board

The assessment of the 12V A3 Technical Drafting Board involved two distinct groups of respondents: expert respondents who evaluated the technical specifications and student and teacher respondents who assessed its instructional use. This multi-faceted evaluation approach allows for a comprehensive understanding of the product's strengths, weaknesses, and overall effectiveness. The insights provided by experts ensure that the product meets technical requirements, while the feedback from students and teachers helps assess its usability and instructional effectiveness. This comprehensive approach helps identify areas of strength and areas for improvement, enabling the researchers to make informed decisions for enhancing the product based on the needs and expectations of its intended users.

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3.2.1. Technical Specifications by the Expert Respondents

The expert respondents assess the technical specifications of the developed 12V A3 Technical Drafting Board in terms of its functionality and maintainability.

Functionality. According to ISO 12616-1:2021 (n.d.), the ability of a product to execute activities or satisfy need is referred to as functionality. Which also refer to a group of features and functions that are given. In terms of a product's intended application, it represents how well it works in practice. The assessment of the expert respondents on the functionality of the 12v A3 technical drafting board was shown in table 3.

Table 3 Assessment on the Functionality of the 12V A3 Technical Drafting Board

Descriptors of Functionality	Weighted Mean	Verbal Interpretation
1. The 12V A3 Technical Drafting Board serves as instructional equipment that can be use during skills training and competency assessment.	3.70	Very Functional
2. The 12V A3 Technical Drafting Board is ergonomically portable because users can carry it anywhere with ease.	3.90	Very Functional
3. The 12V A3 Technical Drafting Board is ergonomically rechargeable because of the built-in 12V lithium-ion batteries with battery management system (BMS).	4.00	Very Functional
4. The 12V A3 Technical Drafting Board is ergonomically adjustable because it can be adjusted into several angles.	3.60	Very Functional
5. The 12V A3 Technical Drafting Board drawing surface can accommodate A3 paper size (11.7 x 16.5 inches or 297 x 420 mm).	3.90	Very Functional
Average Weighted Mean	**3.82**	**Very Functional**

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As shown on table 3, the evaluation conducted by expert respondents provided insights into the functionality of the 12V A3 Technical Drafting Board, as indicated by the average weighted mean rating of **3.82**. This rating is verbally interpreted as **very functional**, suggesting that the board is highly effective in fulfilling its intended purpose. Among the various features evaluated, the respondents gave their highest rating of **4.00** to the board's ergonomic rechargeability which is verbally interpreted as **very functional**. This high rating signifies that the built-in 12V lithium-ion batteries with a battery management system (BMS) are seen as a standout feature, enhancing the functionality and convenience of the drafting board. The rechargeability aspect likely contributes to its portability and ease of use, making it a highly desirable attribute for users. On the other hand, the respondents' lowest rating of **3.60** was assigned to the board's ergonomic adjustability, indicating that there may be some room for improvement in this aspect. Although the rating is slightly lower than other features, it is still verbally interpreted as **very functional**, suggesting that the ergonomic adjustability of the board is perceived positively by the respondents.

The positive response from the respondents indicates that the functionality of the developed device has received their approval. The 12V A3 Technical Drafting Board serves as a versatile instructional equipment that can be used during skills training and competency assessments. Its ergonomic design allows for easy portability, enabling users to carry it conveniently anywhere they go. Moreover, the inclusion of built-in 12V lithium-ion batteries with a battery management system (BMS) ensures that the board is rechargeable and ergonomically efficient. Additionally, the board's ergonomic adjustability is a notable feature, as it can be easily adjusted to various angles to suit the user's comfort and preferences. This adaptability enhances the overall user experience and enables individuals to work in a position that reduces strain and promotes productivity. Furthermore, the ample drawing surface of the board accommodates A3 paper size (11.7 x 16.5 inches or 297 x 420 mm), providing sufficient space for creating detailed and precise drawings.

Maintainability. As mentioned by Bass et.al. (2012), the capacity of a product to be fixed, modified, or altered to satisfy changing requirements or handle problems is referred to as maintainability. It is a characteristic of high caliber that gauges the entire work necessary to identify, correct, improve, or otherwise

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change the product. Table 4 shows the evaluation of the expert respondents on the maintainability of the developed 12v A3 technical drafting board.

Table 4 Assessment on the Maintainability of the 12V A3 Technical Drafting Board

Descriptors of Maintainability	Weighted Mean	Verbal Interpretation
1. The 12V A3 Technical Drafting Board strip LED lights can be replaced easily if out of order.	4.00	Very Maintainable
2. The 12V A3 Technical Drafting Board built-in batteries with battery management system (BMS) can be change easily if busted.	4.00	Very Maintainable
3. The 12V A3 Technical Drafting Board charging port can be restored easily if out of action.	4.00	Very Maintainable
4. The 12V A3 Technical Drafting Board double pole double throw switch can be change easily if broken.	4.00	Very Maintainable
5. The 12V A3 Technical Drafting Board wiring system can be easily changed.	4.00	Very Maintainable
Average Weighted Mean	**4.00**	**Very Maintainable**

Based on the assessment presented in Table 4, expert respondents agreed that the 12V A3 Technical Drafting Board is **very maintainable**. This conclusion is drawn from the fact that the expert respondents gave a perfect score of **4.00** for maintainability. The maintainability of the board is attributed to the ease with which its electrical components, such as strip LED lights, battery management system, 18650 lithium-ion batteries, switch, and charging port, can be replaced if they become faulty or non-functional. Furthermore, the necessary materials for replacements are readily available in the market.

The implication of the high maintainability score and the ease of replacing electrical components is that the 12V A3 Technical Drafting Board can be efficiently repaired and maintained. This is beneficial for the end – users as it ensures that the board can be kept in good working condition even in the event of component failures. The availability of replacement materials in the market

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further supports this advantage, as users can easily acquire the necessary parts to fix any issues that may arise. Additionally, the high maintainability score reflects positively on the design and engineering of the drafting board. It suggests that the researchers have considered ease of maintenance as an important aspect during the board's development. By incorporating easily replaceable components, they have provided users with a practical solution that minimizes downtime and extends the lifespan of the product. From a practical standpoint, the high maintainability of the 12V A3 Technical Drafting Board implies that it can be a cost- effective choice for users. Since faulty components can be replaced easily, there is no need for complete board replacements, which could be more expensive. Instead, users can focus on replacing specific components as needed, reducing both time and financial investments.

3.2.2. Instructional use by the Student and Teacher Respondents

The instructional use of the 12V A3 Technical Drafting Board was evaluated by both teachers and students, considering its instructional functions. The evaluation involved administering an evaluation tool to the respondents, which consisted of five statements. These statements specifically targeted the instructional functionality of the developed device, as indicated in Table 5.

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Table 5 Assessment on the Instructional Use of the 12V A3 Technical Drafting Board

Descriptors of Maintainability	TE	VI	ST	VI	AWM	VI
1. The 12V A3 Technical Drafting Board strip LED lights can be replaced easily if out of order.	4.00	VS	4.00	VS	4.00	VS
2. The 12V A3 Technical Drafting Board built-in batteries with battery management system (BMS) can be change easily if busted.	4.00	VS	4.00	VS	4.00	VS
3. The 12V A3 Technical Drafting Board charging port can be restored easily if out of action.	3.60	VS	3.90	VS	3.75	VS
4. The 12V A3 Technical Drafting Board double pole double throw switch can be change easily if broken.	4.00	VS	3.80	VS	3.90	VS
5. The 12V A3 Technical Drafting Board wiring system can be easily changed.	3.90	VS	3.80	VS	3.85	VS
Average Weighted Mean	**3.90**	**VS**	**3.90**	**VS**		
Overall Weighted Mean					**3.90**	**VS**

The evaluation results presented in Table 5 provide insights into the assessment of the instructional use of the 12V A3 Technical Drafting Board by both teachers and students. The ratings given by the respondents reflect their perceptions of the device's effectiveness in supporting instruction. The highest rating of 4.00, which signifies a very satisfactory interpretation, was given by both teachers and students. This indicates that the Technical Drafting Board was highly regarded in terms of its instructional functionality by both groups. It suggests that the device successfully fulfills its intended purpose and meets the expectations of end – users in terms of supporting teaching and learning activities. On the other hand, the lowest ratings provided by the teachers and students were 3.60 and 3.80, respectively. Despite being the lowest scores, they still fall under the category of very satisfactory. These slightly lower ratings may

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indicate areas where the Technical Drafting Board could be further improved to better meet the specific needs and preferences of teachers and students. It could also reflect some minor limitations or suggestions for enhancement identified by the respondents.

The overall weighted mean of the ratings, which was 3.90 and falls under the very satisfactory interpretation, indicates that the Technical Drafting Board received consistently positive evaluations from both teachers and students. This statistically derived mean score suggests that the device is well-suited and deemed acceptable as an instructional material in various domains, including technical drafting, engineering, architecture, and related courses. The overwhelmingly positive ratings provided by the respondents regarding the instructional capabilities of the Technical Drafting Board hold significant implications. It demonstrates that the device has the potential to be effectively utilized in skills training for ICT qualifications, such as technical drafting, animation, and illustration. These positive assessments affirm the suitability of the device for supporting hands-on learning experiences, fostering creativity, and facilitating the development of technical skills in these specific areas.

4. Conclusions

The development of the 12V A3 Technical Drafting Board adhered to the IPO Model, encompassing input, process, and output stages. In the input stage, the design, specifications, tools, materials, and cost analysis were determined to ensure the feasibility and benefits of the product. The process stage involved prototyping, testing, implementation, evaluation, and revision, refining the board's design and functionality. Valuable feedback from testing contributed to improvements in performance and user-friendliness. The output stage marked the completion of the development process, presenting the fully developed 12V A3 Technical Drafting Board, ready for use, dissemination, or integration into instructional settings.

The feedback from respondents underscores the effective fulfillment of the 12V A3 Technical Drafting Board's purpose. Its portability, rechargeability, and adjustability contribute to its user-friendly nature, particularly for skills training and competency assessments. Expert evaluations highlight its high functionality, emphasizing the positive aspects of the rechargeable feature and adjustable

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angles. The board's maintainability, with easily replaceable electrical components, received praise. While overall satisfaction was expressed by teachers and students regarding its instructional use, there were some identified areas for improvement. In conclusion, the Technical Drafting Board proves to be a suitable instructional tool for technical fields, offering potential applications in ICT skills training for drafting, animation, and illustration.

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