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Development and Assessment of Portable Multipurpose Table with Electronic Devices

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Abstract. This study focused on the development of portable multi-purpose table with electronic devices, designed to offer innovative features and improved functionality compared to market alternatives. The lamp integrates a digital clock for efficiency, a built-in fan for cooling, an electric and USB port for added utility, and a lithium battery to ensure portability and usability during power outages. Its compact design makes it suitable for various settings, including homes, schools, and offices, while also serving as a reliable alternative during power interruptions. The research aimed to create and evaluate the lamp's design, emphasizing portability, safety, and innovation, using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The product was assessed by students, teachers, and industry practitioners based on functionality, usability, efficiency, maintainability, portability, and safety. Functionality received high ratings across all groups, with industry practitioners and teachers giving particularly favorable evaluations. Usability was consistently rated as very usable, while efficiency scores demonstrated the product's reliable performance. Maintainability was deemed very maintainable, highlighting the lamp's ease of servicing. Portability was another strong feature, with all groups praising its convenient and compact design. Safety was also highly rated, affirming its secure and dependable use. The findings confirmed that the developed product is innovative, effective, and suitable for a wide range of users. This multi-purpose table successfully integrates functionality, versatility, and reliability, making it a practical and valuable tool in various environments.

Keywords: *Multi-purpose table, Electronic devices, Portability, Innovation, ADDIE model*

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1. Introduction

The product development in our country is closely related to our K-12 Education System. The new creative invention with multi featured elements is more likely for people while doing their homework. At the present time, portable multipurpose tables with electronic devices are important as our basic needs and flexibility of an hour help all people in energy saving, limited space in our home, moving fast and using integrated development.

In the world of modern technology product development concept is closely related to education. Today people are more likely to have a product with multi feature elements. A schoolboy does homework, accompanied by a table lamp. Nowadays, the kind of table lamp is various and has distinguishing features. There are energy-saving, eye-protecting and other table lamps. The present world is for the innovation and evaluation of new product design and development. The more the world is moving fast, the greater the change is taking place in the designing sector.

A table lamp is a source of light that stands on a table or any piece of furniture. In the family of lamps, they serve as the easiest lighting solutions. With the perfect bulb type, shade, shape, and color modern contemporary table lamps can work as a source of direct or diffused light to enhance the ambiance setting.

Furthermore, a table lamp is a daily need for most of the students and office personnel. Earlier industries focus only on its aesthetic look. But now-a-days along with its aesthetic look, multipurpose use of a lamp has become a vital issue. Today people are more likely to have a product of different features in a single hand. Also, development and assessment of electronically controlled portable multipurpose table lamps is a major element in this purpose.

Likewise, the purpose of the development and assessment of portable multipurpose tables with electronic devices may be used in various rooms, home or office especially for emergency purposes like power interruption and inconvenient places. The product was integrated as one using an electric diagram inside the stand which gives a flexible user interface. Those necessary requirements are needed to install and merge in one place to another and move very easily.

Further, the prime concern is to build a multipurpose table lamp that can be useful and productive to anyone. This product has a multi featured function that has created new dimensions and innovative inventions which give satisfying and a limited space but new creative one.

The design has a frame tubular GI and plyboard with the assimilation of the following features: speaker, USB port, electric port, digital clock, lampshade, switch, integrated fan, trash bin, portable chair and lithium battery.

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Thus, this study also interpreted and created the new design and developed the new multipurpose table that can serve as a beneficial product to anyone, may lead to the development and innovation, to evaluate the new selection and product design of development tools, and can be used for portability and safety.

2. Methodology

The study adopted a quantitative research approach, employing descriptivedevelopmental research methods. As defined by Calderon & Gonzales (2016), a descriptivedevelopmental design integrates descriptive research and developmental research approaches to comprehensively understand a phenomenon. This design is well-suited for thoroughly investigating the development process and evaluating the effectiveness of the improvised portable multi-purpose table lamp.

The integration of the descriptive-developmental design with the ADDIE model provides a robust framework for the research. The analysis phase aligns with the descriptive aspect, involving an in-depth examination of user needs and requirements through surveys. This phase sets the stage for subsequent stages by gathering data on preferences, usability concerns, and portability requirements.

In the development phase, the researcher outlined the specifications and features of the lamp prototype. Using the ADDIE Model, they create orthographic and perspective views, determine necessary materials, and conduct a cost-benefit analysis to ensure feasibility. This phase serves as a blueprint for subsequent stages, emphasizing detailed planning and design.

Implementation involves deploying the lamp prototype into real-world settings to gather feedback from users. This phase mirrors the ADDIE Model's emphasis on practical application and user involvement, enabling researchers to observe the lamp's performance and collect insights from users.

The evaluation phase aligns with both descriptive and developmental aspects, assessing the lamp prototype's effectiveness based on predetermined criteria. Through systematic data collection and analysis, researchers evaluate functionality, usability, efficiency, maintainability, and portability, providing a comprehensive understanding of the lamp's performance.

By integrating descriptive and developmental research approaches, a descriptivedevelopmental design enables researchers to describe the current status of a phenomenon and investigate how it evolves over time. This combined approach offers a holistic understanding of complex phenomena, particularly beneficial in fields like education, psychology, and sociology.

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3. Results and Discussion

This chapter presents the analysis and interpretation of data about the Development and assessment of portable multi-purpose table with electronic devices

Analysis

The analysis was based on the literature review and related research studies relevant to the research topic. The researcher identified problems and challenges in prior studies, leading to the realization that this research holds significant value due to its potential to generate innovative ideas. The study enabled the researcher to create novel concepts, document essential information, design new products, and conceive an inventive prototype. It also focused on identifying the fundamental requirements and outlining the necessary procedures to evaluate the research effectively.

Developing and inventing intricate and appealing plans allowed the researcher to conceptualize advanced technological products and well-designed materials. However, with the rapid pace of innovation, numerous new products have already been introduced in the market. Despite this, the portable multipurpose table with electronic devices demonstrated remarkable improvements, making it more useful and beneficial to users compared to existing market products.

The prototype incorporated integrated lighting, an efficient digital clock, and a practical built-in fan for necessary use. It also featured an electric port and USB port for power supply and charging, utilizing a lithium battery to enhance portability. The lamp's compact design and space-saving features made it versatile, suitable for home use, and especially valuable during power interruptions. Its functionality catered to a wide range of users, offering convenience and utility in various settings.

3.1.1. Cost and Benefit Analysis

Table 1. Cost and Benefit Analysis

Quantity	Unit	Materials	Price
10	mts	1x1x1.2 Tubular GI	₱450.00
3	mts	Plyboard	₱200.00
2	pcs	Cabinet Handle	₱ 50.00
1/4	kl	1" Screw	₱10.00
1	pc	Mini trash bin	₱60.00
2	pcs	Car bumper clip	₱112.00
4	pcs	Buck step-down converter	₱254.00
1	pc	Battery capacity indicator	₱309.00
3	pcs	2" Butt Hinge	₱30.00
1	pc	Electrical tape	₱20.00
2	pcs	Rocker switch	₱50.00

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½	ltr	Epoxy primer	₱150.00
½	ltr	White paint	₱170.00
1	ltr	Acrylic thinner	₱130.00
400	ml	Bosny acrylic Spray Paint	₱90.00
4	pcs	wall paper	₱120.00
1	pc	Car charger switch panel voltmeter	₱720.00
1	pc	LED light	₱130.00
1	pc	16 V Lithium Battery with charger	₱2,500.00
1	pc	Digital clock	₱86.00
7	pcs	USB	₱200.00
10	mts	2 Pin power side LED light connection	₱136.00
1	pc	Bluetooth/MP3 Player/ speaker	₱227.00
1	Pc	Mini Car Electric fan	₱157.00
2	Pcs	Mini woofer speakers	₱220.00
		Labor Charge	₱1,500.00
		Total	₱5,**445.00**

This process helped the researcher to determine the economic benefit of a decision. As shown in the table, the total expenditure of the researcher's project was ₱3,945. 00 and additional ₱1,500.00 for the labor charge which amounted to a total costing of ₱5,445.00 only. The materials are 1x1x1.2 Tubular GI 450, plyboard ₱200.00, Cabinet Handle ₱ 50.00, 1" Screw ₱10.00, Mini trash bin, ₱60.00, Car bumper clip ₱112.00, Buck step-down converter ₱254.00, Battery capacity indicator ₱309.00, 2" Butt Hinge ₱30.00, Electrical tape ₱20.00, Rocker switch ₱50.00, bosny Acrylic Spray Paint ₱90.00, Epoxy primer ₱150.00, White paint ₱170.00 Acrylic thinner ₱130.00 wallpaper ₱120.00, Car charger switch panel voltmeter ₱720.00, LED light ₱130.00, 16 V Lithium Battery with charger ₱2,500.00, Digital clock ₱86.00, USB ₱200.00, 2 Pin power side LED light connection ₱136.00, Bluetooth/MP3 Player/ speaker ₱227.00, Mini Car Electric fan ₱157.00, Mini woofer speakers, ₱220.00, and labor charge is ₱1500.00.

The electric standing table in the market has a price of ₱7, 620.00, (**https://s.lazada.com.ph/s.MiQzY**). This study shows that the price of the product is more affordable than the existing product at the same time the product in the market has limited electrical components and the table can break easily and cannot be used for a longer period of time. The researcher finds that the new innovative and developed product may help produce comfortability, beneficial at the same time development skills can be utilized to provide new inventive products. Multipurpose table was developed within two (2) weeks by the researcher. But if the maker is a skilled worker, it can be developed within a couple of days if all the materials are available.

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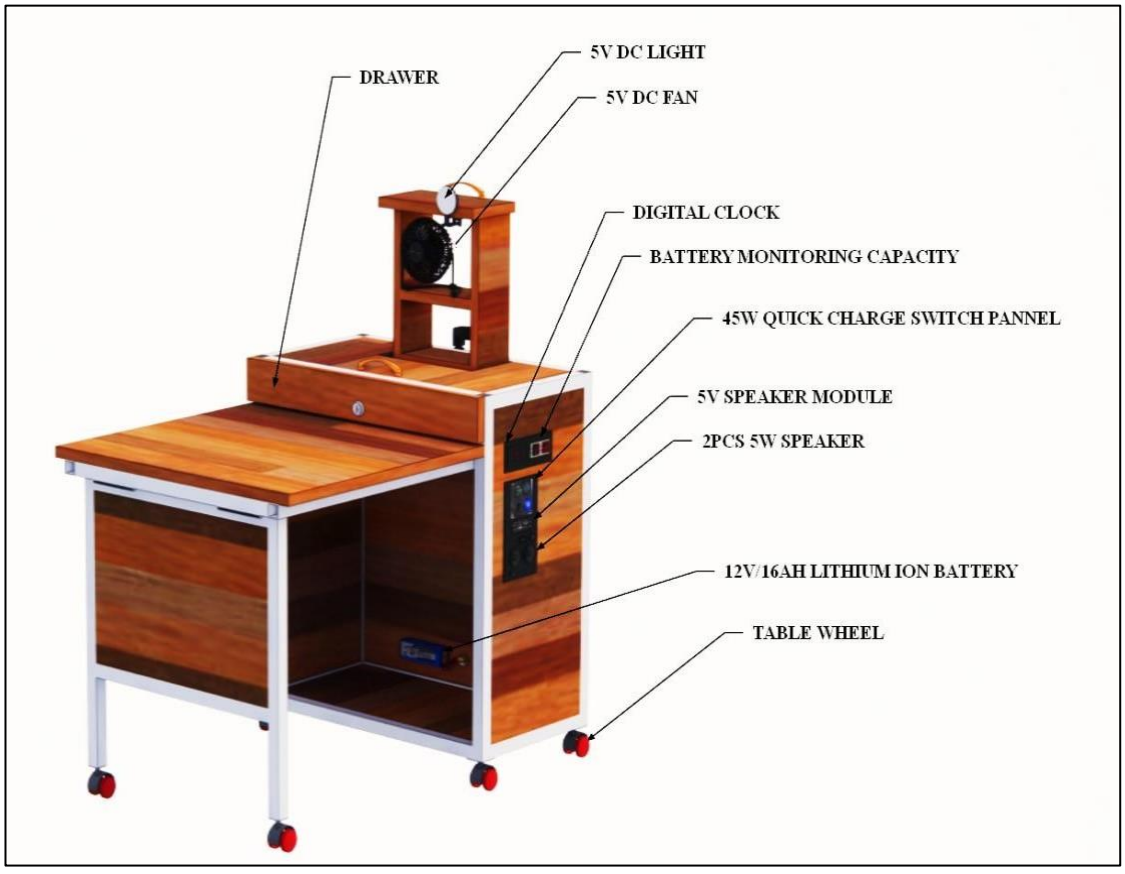
3.1.2. Design Phase

Design is an important part of the plan because it produced to show the look and function or workings of a building, garment, or other object before it is built or made.

Figure 1 it shows the 3D design of the portable multi-purpose table with electronic devices.

Figure 1. 3D Design portable multi-purpose table.



Technical drawing is one of the significant aspects that differentiate the detailed measure that could be interpreted in an artistic way. This also makes the drawing easier to understand, people use familiar symbols, different perspectives and the units of measurement.

Sketch-up was also used to show the different perspective of the drawing which is the portable multi-purpose table.

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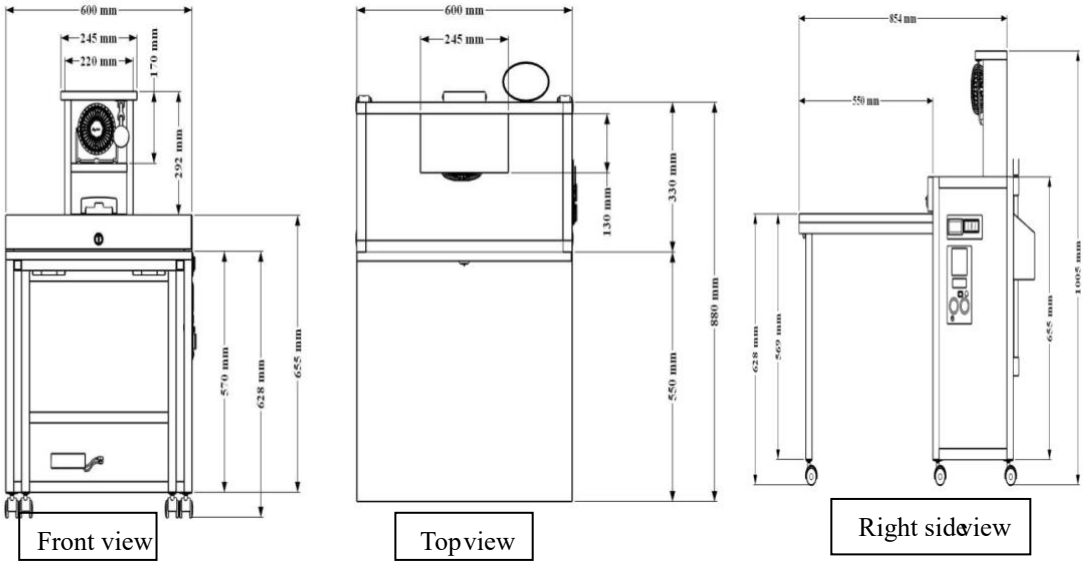
Figure 2. 3D design portable multi-purpose table



3.1.3. Development Phase

The purpose of the development and assessment of portable multi-purpose tables with electric devices products is an important thing that can show the contribution of technological advances of new inventive products. In this way the researcher can give the satisfaction of the customer and provide quality products that can help to increase people's demand.

Prototype Assembly

After preparing the materials and equipment, cost and benefit analysis of the multipurpose table. The development of the product shows the work of prototype assembly, the purpose of the materials, electric components, tools and equipment. In this way the production of the product can help to assess the figurative prototype. There are some pictures taken during the development of the product. The following figure shows the pictures captured during the development.

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Figure 3. Pictures during development

Conclusions

Based on the results of the study, the following conclusions were shown:

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1. Using the ADDIE Model and following the process and development of Gantt chart the portable multi-purpose table with electronic devices has been developed effectively and it works very well.
2. The development and assessment of portable multi-purpose tables with electronic devices technical characteristics were assessed by the respondents.
3. The portable multi-purpose table with electronic devices was described by the respondents' very effective as it was very valuable and beneficial to students, teachers and other respondents that had positive feedback.

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