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RESEARCH ARTICLE

A Low-Cost Design of a Multipurpose Easel Stand for Enhanced Drafting Efficiency

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ABSTRACT

In response to the growing demand for versatile art and drafting tools, this study aims to design and develop a multipurpose easel stand to improve drafting efficiency. Traditional stands often lack adjustability and versatility, posing challenges for users who require comfort and precision. The proposed easel stand addresses these limitations by offering adjustable angles, heights, and compatibility with various tools and materials, benefiting architects, engineers, artists, and students alike. By enhancing user comfort, stability, and efficiency, this study contributes to advancements in drafting equipment design, supporting a productive and ergonomically sound creative process. The findings serve as a basis for further improvements in art and drafting tools, ultimately promoting artistic growth and creative exploration within educational and professional environments.

INTRODUCTION

Art education is an essential part of comprehensive education, fostering creativity, critical thinking, and emotional intelligence (Daubner, 2023). Within the Philippine educational system, the role of art education has gained considerable importance, emphasizing its contribution to developing young minds, instilling cultural appreciation, and nurturing aesthetic sensibilities (Navarro, 2019). Region 3, or Central Luzon, uniquely underscores this significance due to its rich cultural heritage and the growing integration of arts into educational priorities, balancing academic rigor with artistic pursuits to encourage innovative thinking. Through programs that incorporate performing, visual, and digital arts, art education in the region nurtures students' problem-solving skills and aesthetic awareness (Kazis et al., 2004).

Central Luzon's rich historical and artistic traditions, ranging from folk dances to indigenous art forms, contribute to a vibrant educational setting where art plays a role in preserving cultural heritage. Art education not only fosters new forms of expression but also ensures that students connect with traditional crafts, such as the iconic buntal hat weaving in Bulacan and the intricate Kapampangan parols (Christmas lanterns) (Philstarlife, 2023). This continuity of tradition allows students to develop a sense of identity and cultural pride, reinforcing the value of art as a means of self-expression and as a bridge to the past.

Art education also equips students with essential soft skills, such as social interaction and self-esteem, which are valuable both personally and professionally (Becker et al., 2007). Collaborative activities in theater or group visual arts projects encourage teamwork and communication, aligning art education with the competencies demanded in various professional fields (Edelson, 2011).

Moreover, as the economic landscape in Central Luzon expands, the development of creative industries—such as tourism and entertainment—provides students with career opportunities that art education supports by training them in both artistic skills and industry applications (Frezzo, 2017). Schools and cultural organizations in the region play pivotal roles, offering structured programs, festivals, and workshops to enhance students' artistic growth and connect classroom learning with real-world applications (Ranciére, 2009).

Ultimately, art education in Central Luzon contributes to a well-rounded educational experience that prepares students to navigate complex social and economic challenges. While technology advances rapidly and reshapes learning environments, art education remains crucial for maintaining cultural heritage and nurturing creativity among future generations (Edelson, 2011).

The purpose of this study is to design and develop an innovative multipurpose easel stand that enhances drafting efficiency by providing a flexible and user-friendly platform for a range of creative and technical tasks. Traditional drafting stands often have limitations in terms of adjustability and compatibility with various drafting tools, leading to challenges for users who require precision and comfort during extended periods of work.

This study aims to address these limitations by creating an easel stand that is highly adaptable, allowing for adjustments in angle, height, and support for diverse drawing instruments and materials. By developing a prototype that prioritizes user comfort, stability, and efficiency, this study intends to contribute to the field of design tools, benefiting architects, engineers, artists, and students. The findings and outcomes will serve as a basis for future improvements in drafting equipment, ultimately promoting productivity and ergonomics in drafting environments.

METHODS

Research design

This study employed a developmental research design as outlined by Richey (1993), focusing on the systematic process of designing, refining, and evaluating educational products. This design enabled the comprehensive examination of the Multipurpose Easel Stand (MES) throughout its various stages of development and deployment, emphasizing both consistency and effectiveness. The research approach incorporated both quantitative and qualitative methods to provide a thorough understanding of MES's effectiveness. Quantitative methods facilitated statistical analysis, while qualitative insights added depth to the user experiences, preferences, and self-reflections among respondents.

Research Locale

The research was conducted in Region III, Central Luzon, encompassing the provinces of Nueva Ecija, Tarlac, Bulacan, Pampanga, and Zambales. Each province offered a unique socio-economic and cultural landscape. Participants were selected from both rural and urban settings, representing diverse backgrounds such as agriculture, arts, and handicrafts, thus enriching the study with varied insights into MES's usability and impact across different contexts.

Respondents

Table 1: Distribution of the respondents

Nature of Respondents	Address	Number of Respondents	Percent
Art Educators	Nueva Ecija, Tarlac, Bulacan, Pampanga, Zambales	20	15%
Artists		20	25%
Students		60	60%
Total		**100**	**100%**

Data gathering procedure

The study followed the stages of the Hannafin and Peck Model, beginning with needs assessment to identify essential elements for MES's design. The design phase involved creating a conceptual framework, electrical diagrams, and technical plans. The development phase transformed these plans into a functional product, which was subsequently deployed and monitored within its target environment.

Data analysis techniques

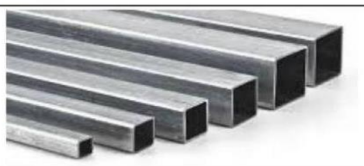
Data were analyzed using weighted means for the quantitative feedback on technical features and effectiveness, employing the four-point Likert scale. The scoring guide classified responses as Very Functional, Functional, Slightly Functional, or Not Functional, aligning with established interpretive ranges. Findings from this analysis were used to assess MES's applicability to Fine Arts and Industrial Arts programs and broader industry applications.

RESULTS AND DISCUSSIONS

A. Materials for the development of a multipurpose easel stand

The selection of tools, supplies, and equipment used in the building of the MES is essential to guaranteeing its longevity, usability, and safety.

Table 9: MES's materials

Name of Material	Image	Description
Tubular Steel		Steel that has been formed into a cylinder or a long, narrow rectangle is known as tubular steel.
Plywood		A structural material consisting of sheets of wood glued or cemented together with the grains of adjacent layers arranged at right angles or at a wide angle.
Palochina (2x2)		Palochina or Palo-tsina is commonly used in making furnitures like tables, cabinets and sofas (frame).
Corner Brackets		Corner braces are used to strengthen the perpendicular join between two materials in a corner
Electrode		An electrode is a solid electric conductor that carries electric current into non-metallic solids, or liquids, or gases, or plasmas, or vacuums.
Wing Bolt		Wing bolts are often used in construction and carpentry to secure temporary structures like scaffolding or to attach components that may require frequent adjustments.

Name of Material	Image	Description
Self-Tapping Screw		A self-tapping screw is a screw that can tap its own hole as it is driven into the material.
Folding mechanism block screw		This screw set is used to mount the vertical stem on the folding mechanism.
Torx Screws		Torx screws are widely used in automotive, electronics, appliances, machine assembly, and high-stress applications due to their durability and resistance to stripping.
Latex Paint (Boysen)		Latex Paint provides excellent weather resistance, forming a protective barrier against UV rays, moisture, and temperature changes.
Rollerblade Caster Wheels		These casters are designed with the universal standard-size stem, so you can transform any task chairs or stools that roll into modern, striking furniture.
Rubber Grip		Designed to cap the ends of metal chair legs, these rubber additions help mitigate damage caused by frequent movement, offering a buffer that reduces scratches,

Name of Material	Image	Description
Grinding Set		These are used for metal cutting and grinding discs have durable cutting edges that are equally effective on metal and wood.
LED Light Pad (A3 Size)		This light pad produces an even white light perfect for tracing. The ultra slim design makes this light pad comfortable when drawing.
Metal Toggle Latch Hasp Lock		This product consists of two elements that create a very sturdy lock that can be closed and opened many times without loosing its strength and efficiency.
Suitcase Handle		To hold the case and carry it more efficiently.

Using premium parts lowers the chance of mishaps and injuries while operating, while also improving performance and efficiency. Purchasing dependable and compatible tools and equipment

also improves overall product quality and cost-effectiveness.

B. The design of a multipurpose easel stand

This include the components of the mechanical system that is in charge of the extraction process as well as the design requirements for the Multipurpose Easel Stand (MES). The technical plan acts as a guide during the development of the MES by offering a comprehensive layout of the mechanical aspects of the device. Figure 1 shows the exploded view and measurement of the technical plan of the MES.

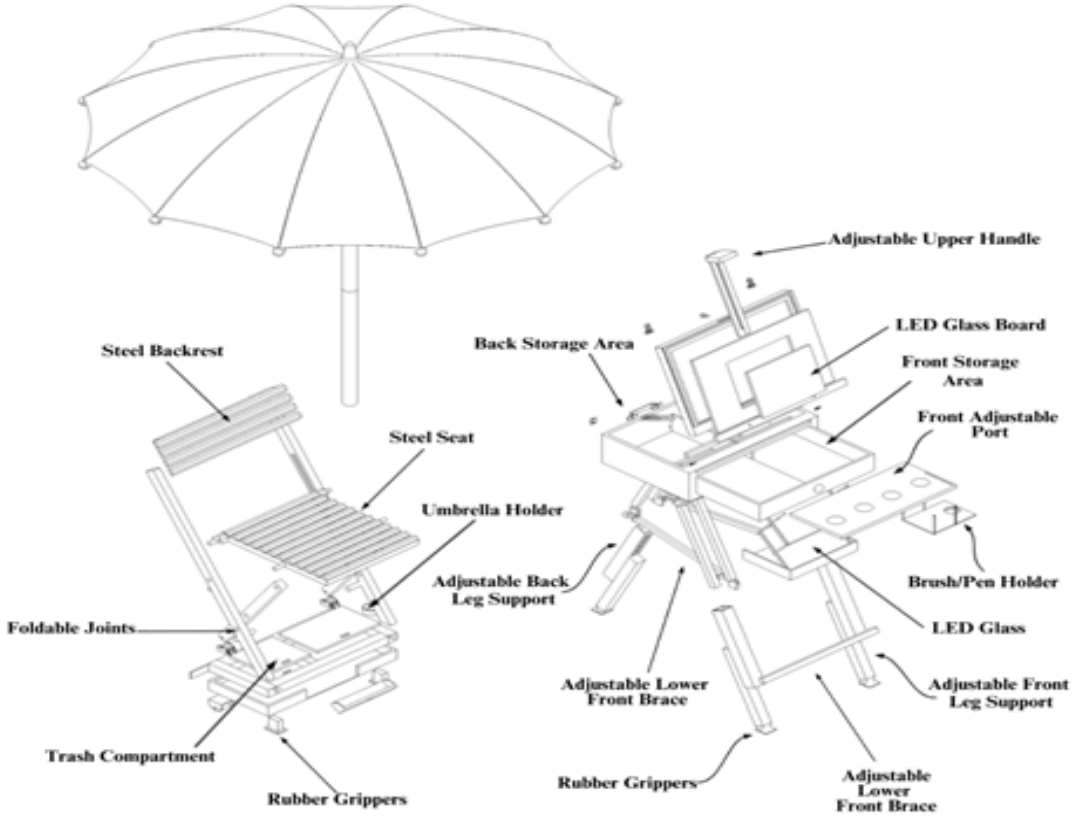


Figure 1: Technical plan of the MES

C. The electrical wiring diagram of a multipurpose easel stand

An electrical system or circuit is shown visually in an electrical diagram, which is often referred to as a wiring diagram or electrical schematic. The electrical diagram served as an illustrated representation of the MES wiring schematic within its environment. Figure 2 shows the electrical wiring diagram of the MES.

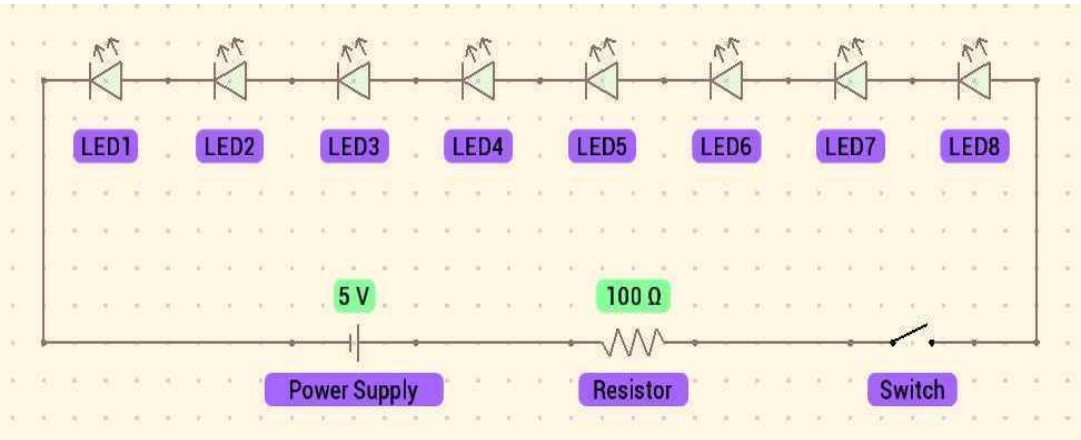


Figure 2: MES's electrical wiring diagram

D. The cost-benefit analysis of a multipurpose easel stand

The cost-benefit analysis (CBA) of the MES project demonstrates its economic viability, confirming that the device is both feasible and advantageous. With a production cost of only ₱5,814.00, the MES is significantly more affordable than comparable commercial easels and drafting desks, which can cost around ₱9,000 or more. This cost advantage makes the MES an accessible and cost-effective option for users, providing substantial savings.

In addition to its affordability, the MES's design is flexible and can be customized to meet various user needs, enhancing its functionality. The use of locally available materials not only reduces costs but also minimizes the environmental impact, aligning with sustainability goals. This localized production process contributes to regional economic development by utilizing community resources and encouraging skill-building and knowledge-sharing in the art industry. By fostering innovation and supporting long-term growth, the MES is a viable investment that meets both economic and social benefits, affirming its feasibility and positive return on investment.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study successfully designed the Multipurpose Easel Stand (MES), demonstrating its value as a versatile, cost-effective, and sustainable tool for artists, students, and art educators. Using a developmental research design allowed a comprehensive approach to product design and evaluation, ensuring that MES meets both practical and educational needs in diverse settings. The mixed-methods approach—combining quantitative data on technical performance with qualitative insights on user experiences—provided a thorough assessment of MES's usability, flexibility, and environmental benefits. The cost-benefit analysis highlights the economic feasibility of MES, with a production cost significantly lower than similar commercial products. Its affordability, coupled with the use of locally sourced materials, enhances accessibility for users while promoting sustainability and supporting local economies. By integrating innovative design features and offering customization options, MES addresses the needs of a wide range of users, fostering creativity, resource efficiency, and skill development in the art community. The project's success underscores MES's potential as a practical and economically advantageous solution that encourages sustainable practices, thus validating its feasibility and contribution to both the art industry and local development.

Recommendation

Further development and prototyping

It is essential to continue refining the CEPSISAD design through iterative development. Engaging with users during this process can provide valuable feedback that will enhance the product's usability and functionality, ensuring that it meets the diverse needs of artists and educators.

Comprehensive testing and evaluation

Conduct thorough testing of the MES in real-world settings to assess its performance and durability. This should include collecting data on user experiences, feedback on functionality, and overall satisfaction. A structured evaluation phase will help identify any necessary adjustments before broader implementation.

Crafting an evaluation instrument

Develop a standardized evaluation instrument tailored to assess the MES's effectiveness, usability, and impact. This instrument should include both quantitative metrics and qualitative feedback mechanisms to capture a comprehensive view of user experiences and the product's performance in different contexts.

Community implementation and impact analysis

Implement the MES in local community settings, particularly in schools, art programs, and community centers. This practical application will facilitate an impact analysis, allowing researchers to gather data on how the design affects users in real-life scenarios. Such analysis will provide

insights into the benefits, challenges, and overall effectiveness of MES in promoting artistic education and accessibility.

Promotion of training and workshops

Organize workshops and training sessions to introduce the MES to potential users, including artists and educators. This initiative can enhance awareness, encourage adoption, and foster community engagement while providing further opportunities to collect feedback on the design's performance.

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