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Development of Trolley Type Drawing and Art Table

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Abstract

Aim: The researcher developed trolley type drawing and art table for research study with the desire to improve, enhance usefulness, mobility and practical ways for drawing and painting activities especially on school-based art making project, commissioned artworks as well as job satisfaction and for economic development.

Methodology: This study employed the developmental method of research, developmental method has been defined as "the systematic study of designing, developing and evaluating instructional programs, processes, and products that must meet the criteria of internal consistency and effectiveness" (Seels & Richey, 1994). The development of trolley type drawing and art table is the modification of the different processes involved in working with mechanical drawing and artwork production in painting.

Results: The development of trolley type drawing and art table implies that the device was planned for a specific purpose in technical drawing and visual art activities, parts can be assemble & dis assemble for workmanship and its function are applicable for end user having basic and technical skills in drawing and painting. The ability to move or be moved freely and easily, also ability to fold and convert drawing board into trolley type device with ball-caster wheel are attach for mobility. The device layout and plan for fabrication are being followed, tools and materials of the device are being used for construction and packaging are well-covered or decorated with paint. It has a capability to be assembled and dis assembled with proper orientation, able to be used in 8 hours a day for mechanical drawing and art activities and effective used for secondary and college students in terms of mechanical drawing and visual art activities. The attached foldable and removable wooden bracing with ball caster wheel attached on the wooden leg can provide a mobility and ease of transportation as well as to practice ergonomically using proper technical specification and feature of the said device.

Conclusion: Development of trolley type drawing and art table can enhance ease of work, adjustable mechanism for painting board for art activities and to perform workmanship for mechanical drawing. Different technical specifications and feature of the device may contribute to the performance level of a person or user in order to meet the expected output in a given time. Moreover, the assembling and dis-assembling of its parts results to a mobility upon working in an indoor/outdoor drawing and art activities which will benefit the consumer or the end user. While acceptability of trolley type drawing and art table are very acceptable for the whole process of output making and to practice ergonomically using proper technical specification and feature of the said device.

Keywords: Composition, Utility, Portability, technical specification and feature

INTRODUCTION

During the Industrial Revolution, draftsmanship gradually became a specialized trade and drawing tables slowly moved out of the libraries and offices of most gentlemen. They became more utilitarian and were built of steel and plastic instead of fine woods and brass (Baskinger and Bardel, 2013).

Very often a drawing table could look like a writing table or even a pedestal desk when the working surface was set at the horizontal and the height adjusted in order to use it as a "normal" desk. The only giveaway was usually a lip on one of the sides of the desktop. This lip or edge stopped paper or books from sliding when the surface was given an angle. It's also used sometimes to hold writing implements. When the working surface was extended at its full height, a drawing table could be used as a standing desk (Gillis and Hammer, 2017).



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Easels became critically important as artists began to explore their natural world. As this was portable, easels enabled artists to paint directly from nature, opening up a whole new world of light and colour based on actual, real-time observation. Arguably, this form of plain air expression gained its greatest momentum in the 19th century with the Barbizon school and the growing interest in impressionism.

As of now, there is no available multi-purpose trolley type drawing and art table in the market. Thus, the researcher was motivated to innovate a table and easel which are different from conventional drafting table and painting stand. An easel makes the work easier and helps maintain a comfortable posture while doing painting activity. It also keeps the perspective precise upon using the said device. Like many other essential materials for creating a good piece of art, an easel too is undeniably important part of any artist's gear.

Some experts might influence on developing and innovating the process of drawing on a table from a traditional way. There might be other means of setting up a drawing table that is conventional for draftsman or artist to used. People are engaged to produce other way to minimize effort in dealing with a dim room or a place to have a lit drawing table. The research paper aspires to provide the most preferred option of a drawing and art table according to the user analysis.

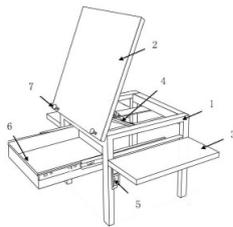
Recently, no available Trolley type drawing and art table in the market which is stand-alone or intact in a single unit. Thus, the researcher was motivated to innovate a device which can be used as an innovative approach in order to help both students and artists in their performance in making mechanical drawing and the quality of their output in painting activities.

Likewise, this device was further developed to assist users work into different functions with minimal procedures and for convenience while at work. It is also different from that of the existing single type drawing table and easel stand in the market in terms of design, composition and technical specification as well as features of the said device.

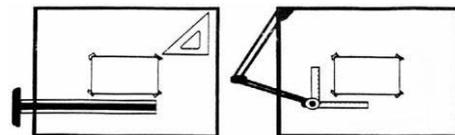
Objectives

- Generally, this study aimed to develop a trolley type drawing and art table. Specifically, it sought to:
- (1) evaluate the qualitative description of developed trolley type drawing and art table in terms of utility, composition and portability;
 - (2) determine applicability of developed trolley type drawing and art table in terms of design, capacity and efficiency; and
 - (3) determine acceptability of developed trolley type drawing and art table as

Review of Literature/Prior Art Search



Multifunctional drawing board table
CN216231424U • 2022-04-0



Drawing Apparatus, Drawing Method, And
Drawing Program Ep3098777A1;2016-11-30



Foldable painting stand US7431257B1 • 2008-10-07



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Multifunctional drawing board table; Drawing Apparatus, Drawing Method, And Drawing Program; Foldable painting stand Dong Guihan 2022; Kodama Yuko 2016; Davis Dave 2008		Development Trolley Type Drawing and Art table By : Warren S. Celoso, 2022	
Similarities:			
❖ Technical/Mechanical drawing	❖ Art/painting activities	❖ Adjustable and foldable	❖ Technical/Mechanical drawing
			❖ Art/painting activities
			❖ Adjustable and foldable
Differences:			
❖ Composed of wooden features	❖ Without Legs	❖ With storage compartment	❖ Single unit device
❖ Furniture Trolley type drawing table	❖ With drawer and storage compartment	❖ With ball-caster wheel for mobility and ease of work	❖ Adjustable, foldable & movable
Innovations:			
❖ Capable to adjust and fold whenever it used	❖ Capable for art activities using easel stand	❖ Capable to assemble/disassemble it used	❖ With foldable, adjustable legs, bracing, bolt and nut adjuster.
		❖ Capable to elevate drawing board	

Figure 1. Presents the Similarities, Differences and Innovation of developTrolley Type Drawing and Art Table

Prior-art Analysis and Invention Spotting

Title of the Technology:	Development of trolley type drawing and art table
Inventor(s):	Inventor : Warren S. Celoso Co-Inventor : Prof. Eduardo F. famucol

Closest prior arts (enumerate all from the Prior Art Search Report):

No.	Document*	General Description**
D1	CN216231424U	Multifunctional drawing board table
D2	US7431257B1	Foldable painting stand
D3	Ep3086777A1	Drawing Apparatus, Drawing Method, And Drawing Program

Disclosed features vs. prior art features

Feature/Part	Invention	Prior art 1	Prior art 2	Prior art 3	Remarks/Comments
Foldable & Adjustable Drawing & Art Table with drawer	Yes	Yes	No	Yes	
30 degree to 90 degree inclined position	Yes	No	Yes	No	
Piano hinges with bolt and nut adjuster	Yes	No	No	No	
Foldable, removable brackets	Yes	No	No	No	
Ball-caster wheel	Yes	No	No	No	
Storage/ Compartment area	Yes	Yes	No	Yes	

Figure 2. Presents the Prior Art Analysis and Invention spotting

History

Drafting tables are an indispensable aid to many artists, architecture and drafting students, and professionals. They are specialized tables having a hinged top that can be raised from flat to upright and at any angle in between. There is a lip or edge running along the stationery edge that allows one to rest pencils, pens and other drawing or drafting elements. The lip also keeps the artwork, designs or blueprints in place when the table top is at an angle. Parallel rulers may also be incorporated into the table top.

This type of table has been around for a long time. Before the Industrial Revolution, they were part of a gentleman's study. He would use it for drawing, painting and for reading large volumes and newspapers. This early table was usually very heavy and made of oak. The raising and lowering apparatus used a lead weight to keep the table top at the desired angle and height.

Drawing, painting and designing became less the province of the gentleman during the Industrial Revolution. The drafting table became more of an office or shop fixture. It was designed to be less heavy and cumbersome and made of less costly materials. The function was unchanged, but the distribution and popularity of these essential tables greatly increased.

Forms of them are found in courthouses and county clerks offices. They are ideal for perusing the bulky and cumbersome index books and legal ledgers. This method of displaying heavy books for reading or display is still popular. Libraries sometimes use them for displaying open newspapers and magazines.

Mostly, though, the modern drafting table is used by artists, designers, architects and some engineers. They still perform the basic functions but there are a wide range of styles and types available.

Student models are widely available in art supply stores. They are lightweight and the lid is held upright by wing nuts and simple assemblies. The table top is usually plywood covered with a durable coating that resists scratches and cuts. The tops are easily removed to allow for portability. Student models run the gamut of prices, depending on the quality of the product.

There's also a full range of professional models available. The pulley system is still an intrinsic part of many professional tables. Often, however, more expensive tables will have the raising and lowering capabilities performed by machinery. Accuracy is paramount in architecture and the more sophisticated models are designed to assist in that exact work.

If you are an artist, you can check online in many art supply stores to see the range of models available for students and artists. Make sure that the size and design of the model you are interested in is appropriate to the desired use. Consider how and where you will be using it and whether it will be used in a fixed place or moved around. Then check to see the shipping rates. The weight of the table and whether it is assembled or shipped in one piece could make a big difference in the final purchase price. Architects and other professionals may find their best choice in specialty stores catering to these professions.

Modern drafting table design provides a lot of flexibility in a single piece of furniture. For example, when stowed in a flat position, the work surface can be used for a wide range of projects, ranging from crafting, to model



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making and prototyping, to sewing and quilting projects. By tilting the table surfaces upwards, drafting tables are transformed into an ideal solution for life drawing and sketching sessions. And, when it is time to make formal presentations, drafting tables can be locked in their upright position to present drawings and other finished works of art for critiques or public gallery showings.

Foldable painting stand

A painting stand is used for supporting articles to be painted. It has bow members for support. One of the bow members is operationally coupled to the other one which are actuatable between a deployed position and a storage position. The deployed position is defined by one of the bow members, positioned at angle to the other one of the bow members to selectively support the articles. The storage position is defined by one of the bow members, positioned substantially adjacent to the other one of the bow members to facilitate storage of the bow members. A pair of extension members are operationally coupled to the bow members whereby each of the extension members extends from one of the bow members to the other one of the bow members. The extension members maintain the bow members at the desired angle when the bow members are in the deployed position. (Foldable painting stand US7431257B1 • 2008-10-07)

Drawing apparatus, drawing method, and drawing program

A drawing apparatus includes a first control unit and a second control unit. The first control unit receives a plurality of image data including a subject from a plurality of cameras, and outputs data obtained from coordinate conversion performed by referring to LUT data. The second control unit derives each of determination distances from optical centers of the plurality of image data with regard to the subject, selects one of the plurality of image data as selection image data on the basis of the determination distance, and rewrites the LUT data by deriving a coordinate corresponding to a pixel of the subject in the selection image data. (Drawing apparatus, drawing method, and drawing program Ep3098777A1;2016-11-30)

Portable multifunctional drawing table

The utility model provides a portable multifunctional drawing table and belongs to the field of drawing tables. The portable multifunctional drawing table comprises an upper adjusting platform assembly and a lower lifting platform assembly, wherein the middle support column of the upper adjusting platform assembly is welded with the plane support plate of the lower lifting platform assembly to form a storage cabinet. The portable multifunctional drawing table has the advantages that the heights of the drawing table can be adjusted optionally during use, and the drawing table is low in manufacturing cost, attractive in appearance and convenient to use. (Multifunctional drawing board table CN216231424U • 2022-04-0)

Trolley

Transporting apparatus, having a foldable container, having a first carrying and rolling arrangement, which is fastened on the container, and having a second carrying and rolling arrangement, which is fastened on the container. (B62B1/12) Hand carts having only one axis carrying one or more transport wheels; Equipment therefor in which the load is intended to be transferred totally to the wheels involving parts being adjustable, collapsible, attachable, detachable, or convertible. (Trolley Ep2195220A2 (B1) • 2010-06-16)

Ergonomics

Ergonomics involves the study of people and their relationship with the environment around them. It often involves research into the way people interact with products and the environment. Anthropometrical data is used to determine the size, shape and/or form of a product, making it more comfortable for humans to use and easier to use. The ergonomics of a product is usually displayed as a drawing such as the one below. Whatever you are designing, it must fit the person it is design for (usually called the customer / client). ERGONOMICS is mainly concerned with working out measurements, in order to improve the design of products. (Salameh, D.H. 2020).

ISO 26800:2011 presents the general ergonomics approach and specifies basic ergonomics principles and concepts. These are applicable to the design and evaluation of tasks, jobs, products, tools, equipment, systems, organizations, services, facilities and environments, in order to make them compatible with the characteristics, the needs and values, and the abilities and limitations of people.



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The provisions and guidance given by ISO 26800:2011 are intended to improve the safety, performance, effectiveness, efficiency, reliability, availability and maintainability of the design outcome throughout its life cycle, while safeguarding and enhancing the health, well-being and satisfaction of those involved or affected.

The intended users of ISO 26800:2011 are designers, ergonomists and project managers, as well as managers, workers, consumers (or their representatives) and procurers. It also serves as a reference standard for standards developers dealing with ergonomics aspects. (Ergonomics, 2011)



Figure 3. Perspective View of Developed Trolley Type Drawing & Art Table

Conceptual Framework

This section of the research paper discusses the direction of the study. Figure 3 shows the conceptual framework of the study. It determines the three (3) factors of the level of applicability upon evaluating the study's dependent variable. These factors includes design, capacity and efficiency. In addition, thematic analysis was also used to determine the acceptability of developed trolley type drawing and art table in terms of technical specification and safety features. Figure. 4 presents the Flow chart of developed Trolley Type Drawing and Art Table such as preparation, operation for technical and mechanical drawing activities, operation of painting stand for visual art activities, arranging and maintaining of the device into its original structure, and assemble and disassemble of its parts into trolley type drawing and art table. Whereas Figure 5 presents the Methodology of Developed Trolley Type Drawing & Art Table.

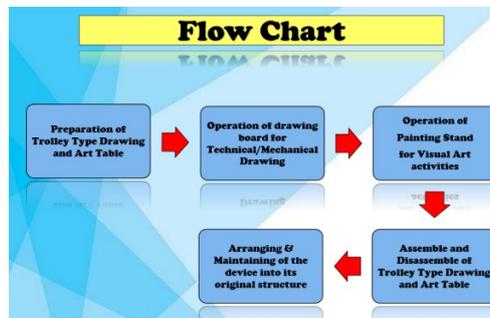


Figure 4. Flow Chart of Developed Trolley Type Drawing & Art Table

Methodology:

The method of research, design criteria, design plan preparation and fabrication, evaluation procedure, instrumentation, data to be gathered, data analysis procedure, operating procedure, parameters for analysis, and cost analysis.

Methods

This study employed the developmental method of research, developmental method has been defined as "the systematic study of designing, developing and evaluating instructional programs, processes, and products that must meet the criteria of internal consistency and effectiveness" (Seels & Richey, 1994).The development of trolley type drawing and art table is the modification of the different processes involved in working with mechanical drawing and artwork production in painting.



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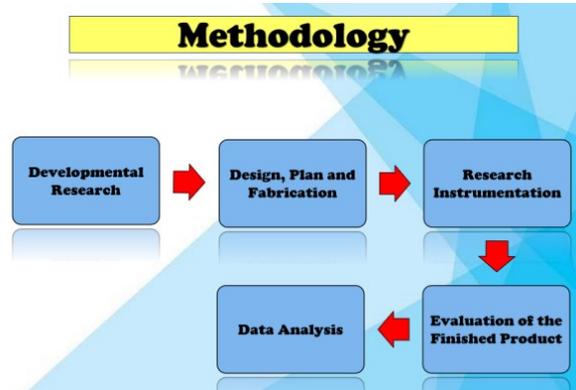


Figure 5. Methodology of Developed Trolley Type Drawing & Art Table

Design Criteria

This study relates to a developed Trolley type drawing and Art table. This innovation is to provide a trolley type drawing and art table that well enhance the ability of a draftsman and artist in order to accommodate the two-way functional preparation and to adopt the skills of utilizing both drawing board and art painting stand.

This device's features patterned from Priestly's (1962) positive criteria in operation, convenient in use, easily installed and disconnected in a working position, economically constructed, relatively simple, and of general superiority and serviceability.

It is further focused on the modification of the different processes involved in working with mechanical drawing and artwork production in painting.

Design Plan and Fabrication

The design is the product of continuous effort of the researcher to come up with a device suitable for mechanical drawing, painting activities or in output making.

In designing, the researcher developed a trolley bag into easel stand and drawing board having its utility, composition and portability in the workplace. The device is composed of different parts which utilize a wooden made box type drawing board with drawing accessories inside of it for engineering drawing. The other component of which is to elevate the handle found on the back side of trolley to make it as adjustable metal tube easel stand for painting application. It also includes caster wheel with lock whenever the device will be used.

Materials

The materials used for the development of trolley type drawing and art table were fabricated with the following; Marine type ply board 1/2" x 18" x 24" are utilized, water resistant and compatible for indoor & outdoor art activities. 1 3/4" x 12" x 10" Wooden fabricated type drawer as storage area for drawing instruments. 1/2" x 24" length attached metal plate hinges are fastened tightly for the used of 30 degree inclined position of the drawing table as painting stand. 1" x 2" x 20" integrated with foldable removable legs and 1" x 2" x 18" bracket system for assembling in upright position with bolt and nut connected to a wooden legs as extension lifter mechanism for balance and support of the table. Attached also are 2" diameter ball caster wheel which are foldable for mobility with ease of use. While, layout and plan for fabrication are being followed, construction of the device are connected properly and packaging are well-covered with epoxy primer top coat acrylic lacquer paint.

Operation of developed trolley type drawing and art table

The structural parts used for the operation were prepared. The drawing table was inspired by a conventional trolley bag that provides multi-functional drawing and art table. It has top coated paint and enables its specific parts



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to work as one and functional. The device includes small storage drawer and the top board is capable to be adjusted in a desired incline angle. All the legs and braces are fit inside the back case of the board and can be carried or kept neatly for transferring in one place to another. Before using, the structural parts were checked if well connected. Also, the wooden adjustable stand were checked for safety precautions. After which, the equipment was used for either drawing and painting activities. Once, the different parts are already connected, the person who are using the equipment will surely be in comfortable position while doing his/her job. When drawing or painting is finished, the easel stand will be arranged into its proper position. The easel stand was arranged and be clean up when the work is done. Finally, ball caster wheel was pulled out in order to utilized as a trolley type drawing and art table for transferring of the device.

Fabrication of developed trolley type drawing and Art table

The device was fabricated with the following procedure. The developed Trolley type drawing and art table is composed of adjustable stand mechanically adjusted by the attached wing nut, while the wooden box type drawing board is a body of a inspired trolley bag attached with are the handle made of metal tube to be a part of the device as painting stand to be used. The measurement was followed according to the specification given in order to meet the concept of the equipment. Cutting of metal pipe by the use of cut-off wheel was more appropriate rather than hacksaw blade. The use of wing nut will provide specific purpose in the connection of extended support of the device. The accessories was found on the wooden back or downside portion of the trolley type drawing table for accommodation and ease of work and the ball caster wheel for the smoothness of movement whenever the device is transferred to one place to another.

Evaluation Procedure

Testing of the developed Trolley type drawing and Art table

Assembling of the device in accordance with the appropriate specification, different parts and function will able to form the extended length and height of trolley bag into easel stand and drawing board when activities or job will be done. The main frame or structure is being utilized were body frame and enclosed equipment are attached for different used. With that adjustable metal tube easel stand utilize for the purpose of doing art or painting activities while caster wheel with lock is being used for safety precautions. On the other hand, the box type drawing board will able to be functional, portable and useful for mechanical drawing. Likewise, another feature of the device is to utilize the easel and drawing board as ergonomically emphasize for mechanical drawing and visual art activity.

Evaluation of the output or finished product

The finished product was evaluated by thirty (30) evaluators who came from the academe which composed of Industrial Technology Drafting and Civil Technology professor, Local Artists, Art Enthusiasts, and Architecture. The equipment was evaluated as to its applicability in terms of design, capacity and efficiency. The equipment was further evaluated based on the acceptability in terms of technical specification and features using a researcher-made evaluation sheet.

Instrumentation and Data Gathered

The evaluation of the product was done using an evaluation sheet which was formulated by the researcher. It was validated by the panel of experts and the members. The evaluation sheet was pre-tested among evaluators who have the same qualification with the evaluators. The evaluators were composed of professionals (Industrial Technology Drafting and Civil Technology professor, Local Artists, Art Enthusiasts, and Architecture) and students who will evaluate the developed trolley type drawing and art table.

To determine the applicability of the device in terms of utility, composition and portability through visual observation and operational component, while product feature were interpreted through actual observation.

The evaluation sheet for the purpose of evaluation was the main data gathering instrument of this study. It is composed of measuring test parameters considered in the study. A five (5) point scale was used as response categories and the acceptability of the utility, composition and portability.

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Scale of Means	Verbal Interpretation
4.21-5.00	Very Acceptable
3.41-4.20	Acceptable
2.61-3.40	Moderately Acceptable
1.81-2.60	Less Acceptable
1.0-1.80	Least Acceptable

Scale of Means	Verbal Interpretation
4.21-5.00	Very Applicable
3.41-4.20	Applicable
2.61-3.40	Moderately Applicable
1.81-2.60	Less Applicable
1.0-1.80	Least Applicable

The data gathering was done through the actual observation and manipulation in determining the applicability and acceptability of trolley type drawing and art table. The accomplished evaluation sheets were gathered and consolidated for scientific analysis and interpretation purposes.

Parameters for Analysis

Developmental study of trolley type drawing and art table is manually operated with drawer type compartment area with bolts and nuts for legs and braces being installed for upright position. While drawing board will be utilized for mechanical drawing and easel stand for art painting activities.

To ascertain the applicability and acceptability of trolley type drawing and art table, the following parameters were considered:

1. Design
2. Technical Specification
3. Feature

This research study developed an instrument to test the specific objective on the quality result of the trolley bag into easel stand and drawing board in terms of utility, composition and portability.

Construction Procedure	Number of months								
	1	2	3	4	5	6	7	8	9
Designing /layout of the device and electrical components and installation	█								
Pre selection of materials		█							
Fabrication			█						
Installation/ Assemble of Components				█					
Checking and review of structure					█				
Construction of the different parts						█			
Product Testing							█		
Testing Revision								█	
Observation and Data Recording									█
Evaluation									

Figure 6. Construction procedure of Develop Trolley Type Drawing & Art Table



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Results and Discussions

Table 1. Evaluate the qualitative description of developed trolley type drawing and art table in terms of;

The data showed in **table 1**, that the qualitative description of the developed trolley type drawing and art table in terms of **utility**, a grand mean of **4.38** which verbally interpreted as **very usable**. This implies that the device planned for a specific purpose in technical drawing and visual art activities, parts can be assemble & dis assemble for workmanship and its function are applicable for end user having basic and technical skills in drawing and painting. In terms of **composition**, a grand mean of **4.36** which verbally interpreted as **very good** which implies that the parts are made of 1/2 x 18 x 24" marine ply board and wooden framing coated with epoxy primer paint and properly fastened its parts and joints, hinges are also attached purposely in terms of inclined/slanting position for art or painting activities with 1" x 2" x 30" foldable/removable legs with adjustable bolt & nut and bracing are made of wooden stick for conversion of trolley type drawing table.

In terms of **portability**, a grand mean of **4.40** which verbally interpreted as **very portable** which implies that the device have the ability to move or be moved freely and easily, also ability to fold and convert drawing board into trolley type device with ball-caster wheel are attach for mobility.

Development of trolley type drawing and art table can enhance ease of work, adjustable mechanism for painting board for art activities and to perform workmanship for mechanical drawing. Different technical specifications and feature of the device may contribute to the performance level of a person or user in order to meet the expected output in a given time.

Utility	Mean	Verbal Interpretation
1. Planned for a specific purpose in technical drawing and visual art activities..	4.50	Very Usable
2. Parts can be assemble & dis assemble for workmanship.	4.30	Very Usable
3. Its function are applicable for end user having basic and technical skills in drawing and painting.	4.35	Very Usable
Grand Mean	4.38	Very Usable
Composition		
1. Made of 1/2 x 18 x 24" marine ply board and wooden framing coated with epoxy primer paint and properly fastened its parts and joints.	4.42	Very Good
2. Hinges are also attached purposely in terms of inclined/slanting position for art or painting activities.	4.35	Very Good
3. 1" x 2" x 30" Foldable/removable legs with adjustable bolt & nut and bracing are made of wooden stick for conversion of trolley type drawing table	4.30	Very Good
Grand Mean	4.36	Very Good
Portability		
1. Ability to move or be moved freely and easily.	4.50	Very Portable
2. Ability to fold and convert drawing board into trolley type device.	4.25	Very Portable
3. Ball-caster wheel are attach for mobility.	4.45	Very Portable
Grand Mean	4.40	Very Portable



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Table 1. Evaluate the qualitative description of developed trolley type drawing and art table in terms of; Utility, Composition and Portability

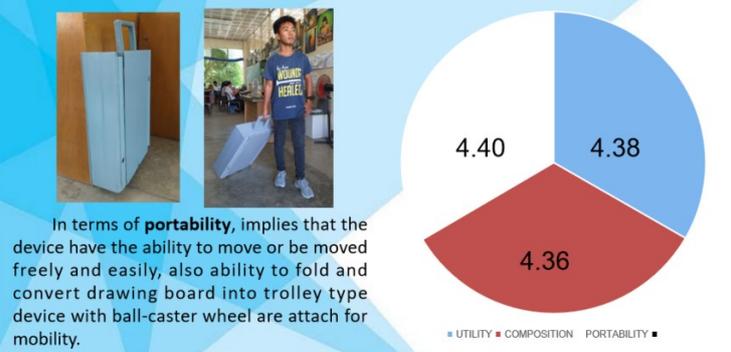


Figure 6. Presents the Qualitative description of developed trolley type drawing and art table

Table 2. Applicability of developed trolley type drawing and art table in terms of design, capacity and efficiency.

The data showed in **table 2**, that the Applicability of developed trolley type drawing and art table in terms of **design**, a grand mean of **4.43** which verbally interpreted as **very applicable**. This implies that the device layout and plan for fabrication are being followed, tools and materials of the device are being used for construction and packaging are well-covered or decorated with paint. In terms of **capacity**, a grand mean of **4.40** which verbally interpreted as **very applicable**. It implies that the device a total measurement of 4" depth, 18" in width and 24" in length drawing board with drawer type weighing 1.5 kilos, a wooden leg and bracing are integrated in converting trolley into drawing table measuring 1" thickness x 2" width x 30" in height with drawer and ball-caster attached with a total load of 15 kilos are applied and constructed for the fabrication of the device. In terms of **efficiency**, a grand mean of **4.32** which verbally interpreted as **very applicable** which implies that the device with a minimum of 10 minutes assembling and dis assembling with proper orientation, capable to used 8 hours a day for mechanical drawing and art activities and effective used for secondary and college students in terms of mechanical drawing and visual art activities.

Thus implies that the applicability of the developed Trolley type drawing and art table different parts can be assembled and dis-assembled resulting for a mobility upon working indoor/outdoor drawing and art activities which can benefit and contribute in the usability of the consumer or the end user.

Design	Mean	Verbal Interpretation
1. Layout and plan for fabrication are being followed.	4.45	Very Applicable
2. Tools and materials of the device are being used for construction.	4.35	Very Applicable
3. Packaging are well-covered or decorated with paint.	4.50	Very Applicable
Grand Mean	4.43	Very Applicable
Capacity		
1. A total measurement of 4" depth, 18" in width and 24" in length drawing board with drawer type weighing 1.5 kilos.	4.40	Very Applicable
2. A wooden leg and bracing are integrated in converting trolley into drawing table measuring 1" thickness x 2" width x 30" in height with drawer and ball-caster	4.45	Very Applicable



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attached. 3. A total load of 15 kilos are applied and constructed for the fabrication of the device.	4.35	Very Applicable
Grand Mean	4.40	Very Applicable
Efficiency		
1. Minimum of 5 to 10 minutes assembling and dis assembling with proper orientation.	4.30	Very Applicable
2. Capable to used 8 hours a day for mechanical drawing and art activities.	4.36	Very Applicable
3. Effective used for secondary and college students in terms of mechanical drawing and visual art activities.	4.32	Very Applicable
Grand Mean	4.32	Very Applicable

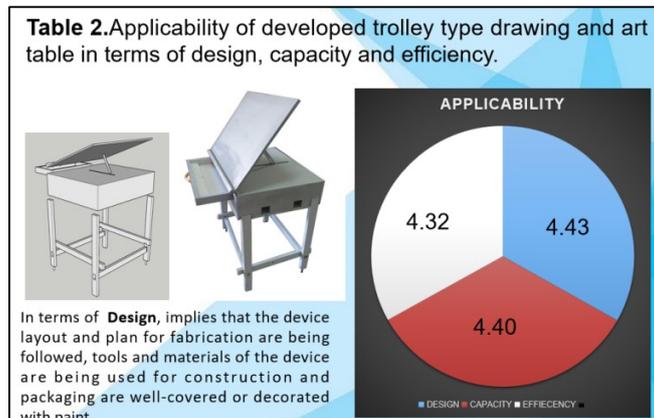


Figure 7. Presents the Applicability of developed trolley type drawing and art table

Table 3. Acceptability of developed trolley type drawing and art table as to its technical specification and features of the device.

The data showed in **table 3**, that the the acceptability of developed trolley type drawing and art table stand considering its technical specification and feature of the device got a grand mean of **4.43** which verbally interpreted as **very acceptable**. This implies that attached foldable and removable wooden bracing with the dimension of 1" thickness by 2" in width and 18" in length with ball caster wheel attach for mobility and ease of transportation got the lowest mean of **4.30** which verbally interpreted also as **very acceptable**. While, 1/2 x 1/2 x 20" piano hinges are attached for inclined/slanting position of the drawing table into painting stand got a highest mean of **4.65** verbally interpreted as **very acceptable**.

Thus implies that the acceptability of the developed trolley type drawing and art table are very acceptable in the whole process of output making and to practice ergonomically using proper technical specification and feature of the said device.

Technical specification and feature of the device	Mean	Verbal Interpretation
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1.) 4" depth, 18" in width and 24" in length drawing board made of marine type ply board measuring coated with lacquer spray paint and water resistant	4.50	Very Acceptable
2) A dimension of 1" x 2" x 30" wooden leg and support bracing are attached in converting trolley type drawing table integrated with drawer type table.	4.30	Very Acceptable
3) 1/2 x 1/2 x 20" piano hinges are attached for inclined/slanting position of the drawing table into painting stand.	4.65	Very Acceptable
4) 1/2 thick x 3/4" wide x 10" length adjustable wooden bracket connected to drawing board in inclined/slanting position for art activities.	4.40	Very Acceptable
5) Attached also are foldable and removable wooden bracing with the dimension of 1" thickness by 2" in width and 18" in length with ball caster wheel attach for mobility and ease of transportation.	4.30	Very Acceptable

Grand Mean 4.43 **Very Acceptable**

Table 3. Acceptability of developed trolley type drawing and art table as to its technical specification and features of the device.

Technical specification and feature of the device	Mean	Verbal Interpretation
Grand Mean	4.43	Very Acceptable



- 1/2" thick by 18" in width and 24" in length drawing board made of marine type ply board with drawer
- 1/2 x 1/2 x 20" piano hinges
- with ball caster wheel attach for mobility
- 1/2 thick x 3/4" wide x 10" length adjustable wooden bracket
- 1" x 2" x 30" wooden leg and support bracing

Table 8. Presents the Acceptability of developed trolley type drawing and art table



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Conclusions

Based on the findings of the study, the following conclusions were drawn:

Development of trolley type drawing and art table can enhance ease of work, adjustable mechanism for painting board for art activities and to perform workmanship for mechanical drawing. Different technical specifications and feature of the device may contribute to the performance level of a person or user in order to meet the expected output in a given time.

Moreover, the assembling and dis-assembling of its parts results to a mobility upon working in an indoor/outdoor drawing and art activities which will benefit the consumer or the end user.

While acceptability of trolley type drawing and art table are very acceptable for the whole process of output making and to practice ergonomically using proper technical specification and feature of the said device.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are forwarded.

Therefore, it may suggest that fabrication of the device will be more durable if material used made of aluminum tubular type framing for drawing table with laminated fiber panel interior and exterior of the device. Fibre optics and aluminium cladding with moulding should also be utilized.

Further innovation, includes using laptop holder or board for Computer-Aided Design attach to the drafting table covered with pull-up type cover of the said table.

It is also encouraged to improve the features of the device that makes more beneficial to the user itself and that can also be tested to enhance the design of the product.

Materials for locking mechanism should be a wing nut type of screw type mechanism for easier removing of its parts with ease of use.

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