AN INSTRUCTIONAL MODEL FOR DESIGNING INNOVATED PORTABLE TABLE ROUTER TRAINER

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ABSTRACT

This study is about Innovated Portable Table Router Trainer, as instructional guide in Interior Design Technology (IDT) at Cebu Technological University (CTU)- Main Campus, Cebu City as basis for an Instructional Guide. There are three phases of the study- The development of the trainer, the evaluation of its level of acceptability and effectiveness, and the significant difference of the perceptions of the respondents group on the acceptability of the trainer.

The level of acceptability of the Portable Table Router Trainer in terms of its design as rated by both the experts and students is Highly Acceptable with the average weighted mean of 4.67 and 4.65. The effectiveness of the Portable Table Router Trainer with its functions as rated by the experts is described as Highly Effective with the weighted mean of 4.72. This means that the trainer met the standards and is very functional in performing each function.

The test of significant mean difference between the perceptions of the two respondent groups on the acceptability of the trainer shows that the computed t-value is 0.36 lesser than the critical t-value of 2.04 at alpha level of 0.05, is the two - tailed test. Therefore, the null hypothesis, which states that; "There is no significant mean difference between the perceptions of the respondent groups on the acceptability of the trainer", is accepted. So, both the experts and the students have the same perceptions on the acceptability of the Portable Table Router Trainer.

Based on the findings, it is concluded that the Innovative Portable Table Router Trainer met the standards and is very useful in performing each function for IDT instructions. Hence the instructional guide is adopted.

Keywords: Innovation in woodworking, Instructional model Portable table router.

INTRODUCTION

The increased emphasis on Industrial Technology and information-based market place today remains uninterrupted in providing the demands and comfort of an impressively large number of people (Anderson & Rainie, 2018). Work with power-driven tools is constantly gearing for the most efficient and effective devices that the whole world can benefit from (Benini & de Micheli, 2000). Manufacturing firms need skillful and competent workers to perform their industrial plans. Knowledge-based skills can be obtained through constant training to enhance workers' abilities (Baldwin,Gray & Johnson,1995).

Through course content during class activities, a student is being trained to internalize not only the theoretical aspect, but also the practical application of expertise and the notion of producing a tangible output (Willis, 2004). Constructing this new facility and moving this product into full-scale production represent benefits.

Definitely, a student studying in schools specializing in industrial techniques, are trained in various skills; they equip themselves with the most up-to-date technology (Ribble, 2015). Indeed, adequate tools and equipment matter most in every activity performed by each individual in the field of work (Preston, 2002).

Private or public institutions consider as important to have the practical ability in terms of adequacy of classrooms conducive to learning, school plants, and the availability of machine and equipment, hand tools, training facilities, and the latest technology as well. Oftentimes, a school encounters problems such as scarcity of training facilities and equipment. The increasing number of students of CTU-Main Campus every year has encouraged the researcher to make an inventory of the school facilities and equipment. At present three to five students share in one tool for an activity, considering the availability of equipment and tools in the shop. The same situation is experienced, particularly by the Interior Design Technology.

This is one of the reasons why professors in Technology Education at CTU or some other institutions of learning, especially colleges or universities that design projects that would enable the students to make their work easier and faster through the use of high-end instructional equipment or tools. To augment the process of doing some technical works in the department, the researcher created an Innovated Portable Table Router. These machines are available in the market but, they are very costly.

Thus, this study has been conducted to present the process of making an Innovated Portable Table Router for IDT of the Bachelor of Science in Industrial Technology (BSIT) Program of the CTU-Main Campus, Cebu City.

CONCEPTUAL FRAMEWORK

The law of intensity, presented by Nourrit, et. al (2003) proposes that when anything is studied from simple to most complexes there is learning.

These are the reasons why the government created some laws to solve these problems. Article XV, Section 8, paragraph 4, of the 1987 Philippine Constitution states that all educational institutions shall aim to inculcate love of the country; teach the duties of citizenship, and develop moral character; personal discipline; and scientific, technological, and vocational efficiency (Philippine Constitution, 1987).

The Technical Education and Skills Development Act of 1994, Section 2 and 4 aims to strengthen linkages between Academe, Industry and the Government to ensure that appropriate skills and knowledge are provided by the educational system (Republic Act no. 7796). The Act of 1994 wants the trainee to spend more time in the laboratory and actualization works.

Project making has been going on for decades but the purely academic educators had never seen these situations in the university and school compounds (Bok, 2003). They only discovered the situation in recent time.

In answer to these needs of technology, the proponent conceptualizes an Innovated Portable Table Router that can provide a healthy environment that is eventually in relation to correct posture, comfort, freshness, functional output, sophistication, economical matter and beauty inside the shop. With the contribution of this tool, there is flexibility and maximization in handling. The functions of Innovated Portable Table Router will answer some Interior Design problems. This could be used as project for the students providing the basic skills in Interior Design Technology. Trained individuals in the field of Interior Design Technology can make use of the multi-faceted functions (Makki, et.al, 2019). He states that his construction of innovated table saw with router has met the standard in design for its acceptability on ergonomics and work implements, for enhancement skills and learning of students.

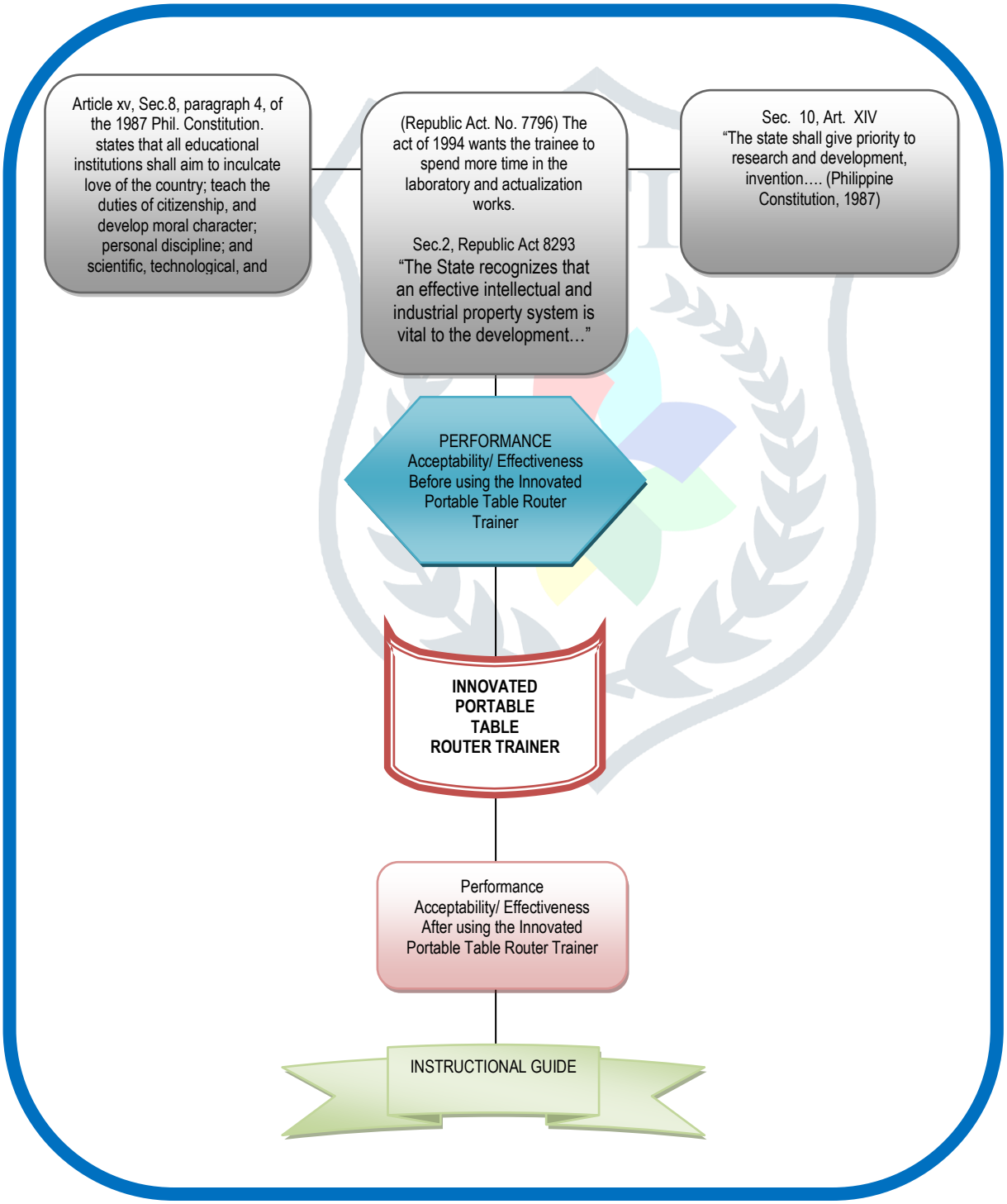

Figure 1. Conceptual Framework of the study

STATEMENT OF THE PROBLEM

This study aimed to create an instructional guide of designing innovated portable table router trainer.

Specifically, it ought to answers to the following questions:

1. What are the technical requirements for the construction of an Innovated Portable Table Router as to its:
   - 1.1 design;
   - 1.2 ergonomics; and
   - 1.3 construction?
2. As perceived by the respondent group to what extent
   - 2.1. is the acceptability of the constructed Innovated Portable Table Router as aforementioned?
   - 2.2 is the effectiveness of the portable table router in terms of: 2.2.1. lapping
     - 2.2.2 mortising
     - 2.2.3 dovetailing
     - 2.2.4 rabbeting
     - 2.2.5 molding
3. Is there a significant difference between the perceptions of the respondent groups on the acceptability of the constructed Innovated Portable Table Router trainer*?*
4. Based on the findings what user's instructional guide can be developed?

NULL HYPOTHESIS

The given null hypothesis was tested at alpha 0.05 level of significance.

Ho1. There is no significant mean difference between the perceptions of the respondent groups as to the acceptability of the constructed Innovated Portable Table Router trainer.

RESEARCH METHODOLOGY

This study used the descriptive method of research to gather facts relevant in achieving the discussion details in planning, designing, and constructing the IPTR with dust collector. Normative survey is the mode of acquiring data that uses the questionnaire as the main instrument.

In the research flow diagram as presented in figure 4, the input of the study involves conceptualization on planning and designing stage. It included preparation of working drawings, materials cost, set of orthographic drawing, detailing and its assembly sequence.

The process involved project making and operational module that included hand tools, power tools, supplies and materials, safety gadgets, and cleaning paraphernalia. After completion of the IPTR, the students and instructors validate the output of the study.

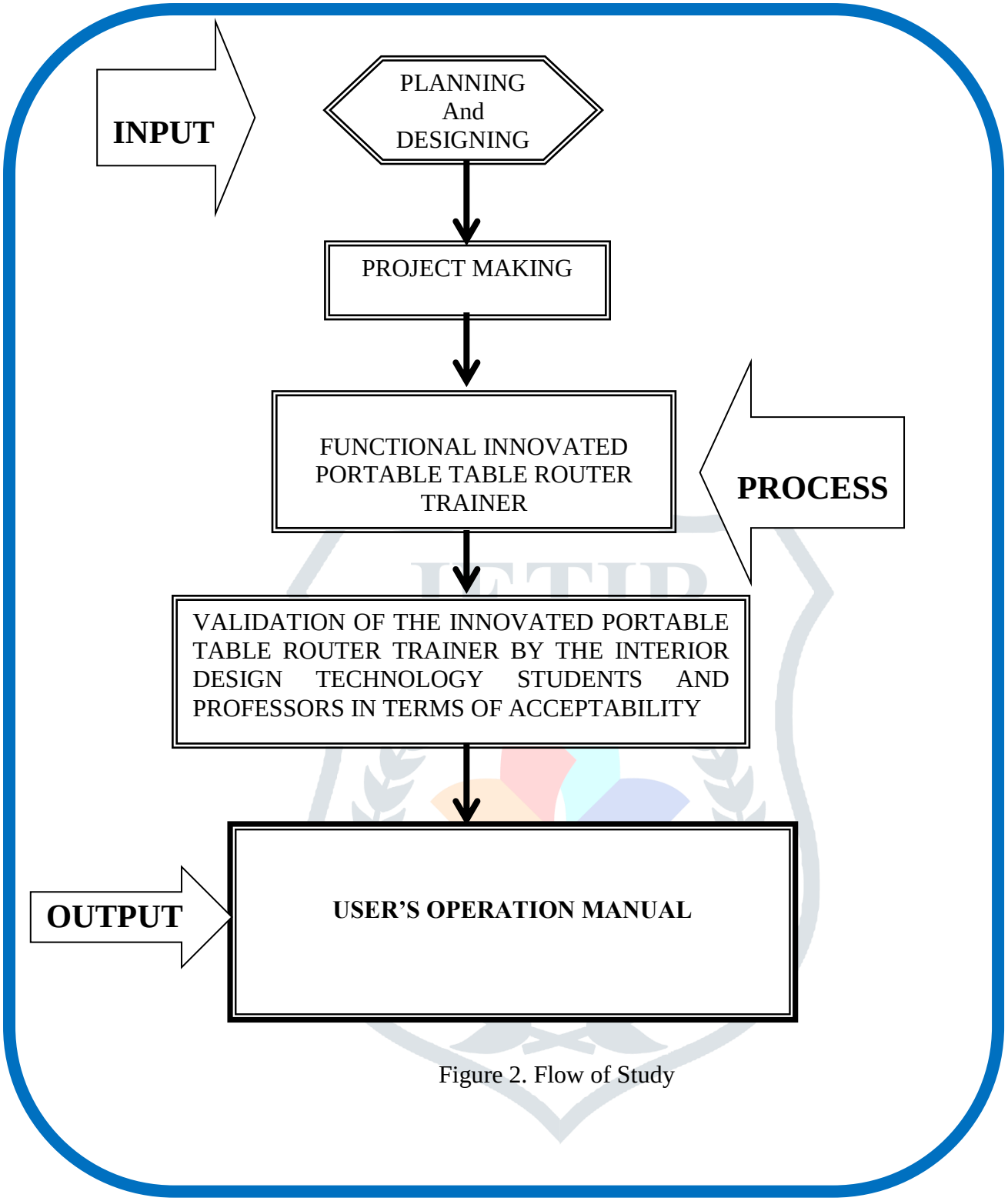

Figure 2. Flow of Study

Environment

The study was conducted at Cebu Technological University – Main Campus, Cebu City: It is government-owned institution which offers Technology and Professional courses under the College of Technology, College of Engineering, College of Art and Sciences, College of Education and the Graduate School. Particularly, the study was conceptualized and carried out at the shop of the College of Technology where classes are held for Bachelor of Science in Industrial Technology, and Master in Technician Education major in Civil Technology.

Respondents

The subjects of the study were determined by randomly selected method as a requirement for the intended study. Specifically, it included first year and second year Bachelor of Science in Industrial Technology – Civil Technology students; Civil Technology instructors and professors of Cebu Technological University – Main Campus. All second year Bachelor of Science in Industrial Technology major in Civil technology students were chosen to validate the acceptability of the IPTR with dust collector. They are considered as skillful in their own field.

Table 1
Distribution of Respondents

Respondents	N	Sample Size	Percentage
Students/ BSIT	22	22	68.75%
CTU – MC Professors and Instructors	10	10	31.25%
TOTAL	**32**	**32**	**100%**

Treatment of Data

The data gathered from the survey questionnaire were tallied, collated, tabled and subjected to the following statistical treatments: the Weighted Mean, this was used to determine the respondents' perception in the applicability level and the effectiveness of the Innovated Portable Table Router with Dust Collector, and the t-test. This was used to determine the significance between the mean validation on the use of the innovated portable table router and its performance.

RESULTS AND DISCUSSIONS

Technical Requirements of the Innovated Portable Router Trainer

Design

The Technical requirements for the design: includes Detailing Drawing, List of Materials, List of Supplies, and List of Tools and Equipment.

Detailing Drawing

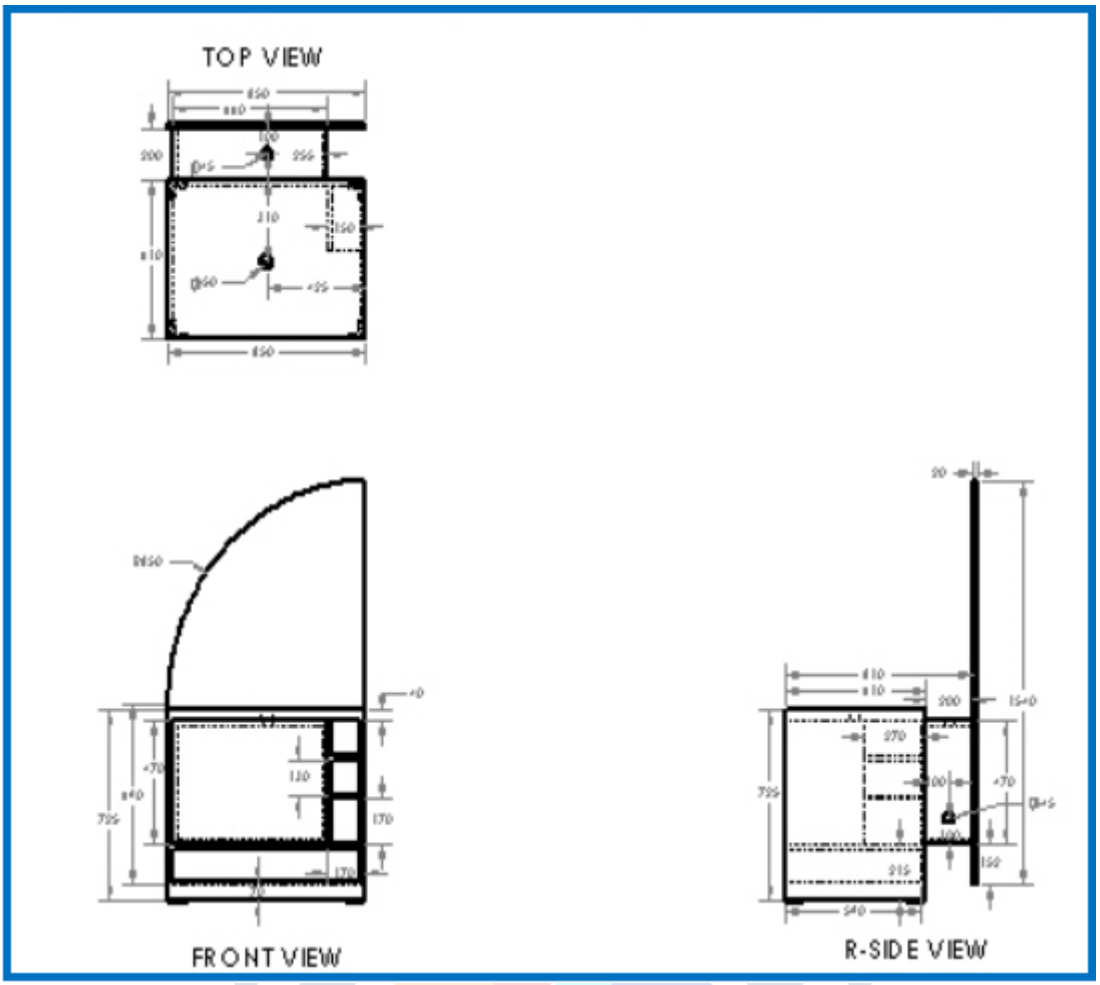

Figure 3. Detailing Drawing

List of Materials and Supplies Cost

Table 2
List of Materials and Cost

Qnty.	Unit	Description	Disposition	Price
1	piece	Ply Board, 12mm x 605mm x 804mm	Top Table	P 495.57
1	piece	Ply Board, 10mm x 400mm x700mm	Bottom Drawer Box	P 268.08
1	piece	Ply Board,10mm x 96mm x 504mm	Slide Drawer	P 495.57
1	piece	Aluminum, 12mm x 2000mm	Edging	P 75.00
10	pieces	Lawaan Wood, 12mm x 100mm x 500mm	Front Drawer	P 104.00
2	pieces	Lawaan Wood, 40mm x 62mm x 610mm	Side Panel	P 300.00
4	pieces	Bolt Glider, 8mm dia x 25mm	Top Table	P 60.00
1	piece	Lawaan Wood, 30mmx 50mm x 600mm	Horizontal Sole Support	P 100.00
4	pieces	Wooden Screw	Circular Pivot Plate	P 35.00
6	pieces	Metal Screw	Upper Leg Frame	P 52.50
1	piece	Portable Router	Table Set up	P 12500.00
1	piece	Vacuum	Dust Collector	P 2700.00
2	pieces	201A 24” Aluminum Fence	Side Fence	P 249.00
2	pieces	201C Phenolic	Fence Base	P 50.00
2	pieces	201D Dust Portblock	vacuum	P 6.00

2	pieces	201E Cover	Hose pipe	P 25.00
1	piece	201F Dust Port Plate	Fence Guide	P 75.00
2	pieces	201G 2-1/4” Double Track	Bit support	P 105.00
14	pieces	5760B Oval Nuts	Router support	P 85.00
8	pieces	MF010 1/4-20 x 3/4” Flathead Screw	Templet Guide	P 40.00
2	pieces	MF032 1/4-20 x 3” Flathead Screw	Templet Guide	P 10.00
		Sub-total Cost of Materials		**P 17,830.72**

The materials stated in Table 2 were available in the vicinity. These are scrapped materials such as steel plates, block iron pipes and square tube. These items were recycled for the purpose of maximization of materials. This implies that the fabrication of an Innovated Portable Table Router Trainer can be made with minimal cost and fully utilized by the students for making their civil work exercises.

Table 3
List of Supplies and cost

Qnty.	Unit	Description	Uses	Price
2	Shts.	Sand Paper # 80, 12” x 12”	It is used for sanding rough wood surfaces	P 8.50
2	Shts.	Sand Paper # 120, 12” x 12”	It is used for sanding semi-rough wood surfaces	P 8.50
2	Shts.	Sand Paper # 400, 12” x 12”	It is used for sanding finished wood surfaces	P 8.50
1	Liter	White Glue D4	It is used for wood lamination and joineries bonding	P 54.00
1	Liter	Sanding Sealer	It is used for applying wood fiber sealed	P 150.00
1	Pint	Tinting Color Black	It is used to mix with the primary color paint	P 60.00
2	Liters	Lacquer Thinner	It is used to mix to the paint for quick drying	P 150.00
1	Liter	Paint Thinner	It is used to mix with tinting color for wood stain	P 100.00
2	Liters	Clear Gloss Lacquer	It is used to apply as a final painting for smoothness and clearness	P 150.00
1	Liter	Spot Putty White	It is used to fill with a small holes of the wood.	P 50.00
5	Sticks	Welding Rod	It is used to join metal to metal and fasteners	P 60.00
Sub-total Cost of Supplies :				**P 799.50**

The supplies used were purchased for this project and the cost is affordable. These supplies are locally available so they can be bought from many construction supplies.

The construction of an Innovated Portable Table Router Trainer can be prototype while the materials and supplies are locally found.

Tools and Equipment

Tools and Equipment used in the construction of the Innovated Portable Table Router Trainer and their respective functions are shown in Table 4.

Table 4
Tools and equipment list and its functions

BASIC TOOLS	FUNCTIONS
Scriber	Marking tools used as tracing and guiding tools to measure part of the materials ready for cutting.
Center punch	Marking tool for guide of drill bit in drilling a hole.
Pencil	Mark line in papers, wood and metal to be cut.
Straight Edge	Refer to any measuring device that is straight and used for measuring distance, usually made of steel, wood and copper.
Pull push rule	A thin sheet metal measuring tool commonly used for measuring long distances.
Hacksaw	Used to cut angle bars, flat bars and round bars according to specifications.
Files	Cut rough area of unfinished weld surface to make it smooth and plain.
Angle Grinder	An electrical power tool used to grind welded area of object in order to flatten or soften the rough surface.
Portable Hand Drill	An electrical power tool used to drill a hole using a twist metal drill bits or to drill for a hole on objects like metal, wood and others.

Ergonomics

The technical requirements for ergonomics include Mount Router (Dust Port Plate and Router Plate), Router Fence Assembly, Vacuum Pipe Adjuster and Template Guide.

Figure 4. Mount router

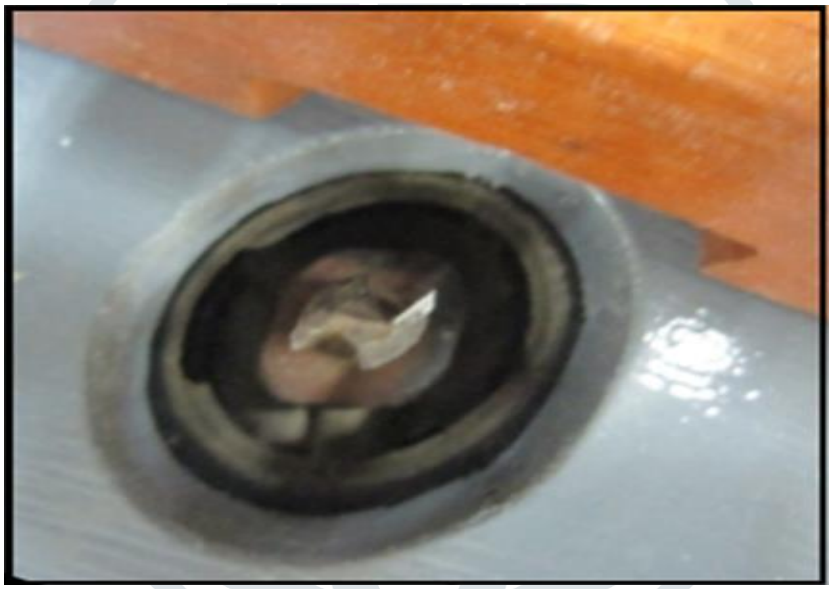

Figure 5. Router Fence Assembly

Figure 6. Vacuum Pipe Adjuster

Figure 7. Template Guide

Construction

Construction process shows how the Innovated Portable Table Router Trainer is being constructed. It gives the sequence of information and operations needed.

The researcher constructed the Innovated Portable Table Router Trainer parts by parts. It is important to take note that possible sequence of operations are given to the following: Laying-outing and Constructing, Mounting and Assembling, and Testing.

Procedures

The procedures needed in the construction of the Innovated Portable Table Router Trainer includes the Laying- outing, Constructing, Sanding and Painting, Mounting and Assembling, and Testing.

1. Laying-outing
    1.1. The researcher prepares all materials and tools needed for the construction of the Innovated Portable Table Router Trainer.
    1.2. The materials are laid on top of the working bench for marking.
2. Constructing
    2.1. Put straight edge on top of the materials.
    2.2. Clamp the straight edge as a guide for slicing of plywood.
    2.3. Cut, bending and filing side panel for vacuum.
    2.4. Slicing, laminating, clamping, routing, sanding of solid wood for drawer.
    2.5. Cutting and forming of side panel board.
    2.6. Turning and boring of top board for screw. Boring and mounting of fence.
3. Mounting and assembling
    3.1 Lay the base plates and supports and check for the angles.
    3.2 Erect the two panel board frames and screws by the clip board.
    3.3 Attach vacuum compartment under the Router.
    3.4 Attach the Portable Router under of the table frames.
    3.5 Attach the top surface to the template guide.
    3.6 Attach the router guide of the table
    3.7 Tighten all screws attached to the wood frame.

4.0 Testing
    4.1 Position the Innovated Portable Table Router Trainer on top of the finished floor level.
    4.2. Adjust the bit located at the bottom parts of the router.
    4.3. Check the c-clamp of the router guide at the end of the table.
    4.4. Pull and push the platform.
    4.5. Adjust angle of the portable table router trainer using the straight bit.
    4.6. Rotate the jig in order to have a good profiling.

Extent of Acceptability of the Innovated Portable Table Router Trainer

The Innovated Portable Table Router trainer was rated by the students and experts in terms of its level of acceptability as to the design, ergonomics, and construction. The design was focused on detailed drawing in terms of its standard being followed, clarity of drawing, and correct usage of lines and symbols; the ergonomics was focused on the rigidity, comfort, safeness, and durability of the trainer; and construction was also focused on proper usage of tools and machine, safety habits, quality of the trainer, steps and scheduling of operations.

Design

The design was focused on the detailed drawing with the American National Standard Institute (ANSI) standards strictly followed, clarity of dimensions in different views, clarity of drawing details needed for

construction, correct usage of line and symbols, smoothness or neatness of drawing, and clarity of pictorial views.

Table 5 reveals the extent of acceptability of the Innovative Portable Table Router trainer in terms of design as rated by both the experts and students.

Table 5

Extent of the acceptability of Innovative Portable Table Router Trainer in terms of design

DESIGN	ACCEPTABILITY THE CONSTRUCTED PORTABLE TABLEROUTER			
	FACULTY (n = 10)		STUDENTS (n = 22)	
	X	VD	X	VD
American National Standard Institute (ANSI) Standards are strictly followed in the drawing	**4.60**	HA	**4.64**	HA
Clarity of placing dimensions of different views for direct measuring	**4.80**	HA	**4.64**	HA
Clarity of drawing details needed for construction	**4.60**	HA	**4.82**	HA
Correct usage of line and symbols	**4.50**	HA	**4.86**	HA
Smoothness of surface	**4.70**	HA	**4.45**	HA
Clarity of pictorial views	**4.90**	HA	**4.82**	HA
AVERAGE WEIGHTED MEAN	**4.68**		**4.70**	
INTERPRETATION	**HIGHLY ACCEPTABLE**		**HIGHLY ACCEPTABLE**	

where: TWP is Total Weighted Points X is the Weighted Mean
VD is Verbal Description HA is Highly Acceptable
MA is Moderately Acceptable FA is Fairly Acceptable
LA is Less Acceptable UA is Unacceptable

As revealed in the table, American National Standard Institute (ANSI) standards are strictly followed, and the clarity of dimensions in different views, clarity of drawing details needed for construction, correct usage of line and symbols, smoothness or neatness of drawing, and clarity of pictorial views are described as Highly Acceptable by both the experts and students with the weighted mean of 4.60 and 4.64; 4.80 and 4.64; 4.60 and 4.82; 4.50 and 4.86; 4.70 and 4.45; and 4.90 and 4.82 respectively. The Average weighted mean of 4.68 and 4.70 of both experts and students are described as Highly Acceptable.

This means that the Extent of Acceptability of the Innovative Portable Table Router trainer in terms of design met the technical requirements for the construction and would be very much fitted to the need of the Interior Design Technology shop as a new innovated device for furniture and cabinet making.

This implies further that the presence of the Innovative Portable Table Router trainer as a new device in IDT shops would lessen the scarcity of the necessary tools and equipment.

Ergonomics

The ergonomics was focused on the rigidity of the Innovative Portable Router trainer; comforts in using the portable router trainer; safeness, and durability of the portable router trainer.

Table 6 presents the extent of acceptability of the Innovative Portable Table Router trainer in terms of ergonomics as rated by both the experts and students.

Table 6
Extent of acceptability of the Innovative Portable Table Router Trainer in terms of ergonomics

ERGONOMICS	ACCEPTABILITY THE CONSTRUCTED PORTABLE TABLEROUTER			
	FACULTY (n = 10)		STUDENTS (n = 22)	
	X	VD	X	VD
Rigidity of the portable router trainer	**4.80**	HA	**4.50**	HE
Comfortability in using the portable router trainer	**4.60**	HA	**4.73**	HE
Safeness in using the portable router trainer	**4.60**	HA	**4.77**	HE
Durability of the portable router trainer	**4.50**	HA	**4.55**	HE
AVERAGE WEIGHTED MEAN	**4.63**		**4.64**	
INTERPRETATION	**HIGHLY ACCEPTABLE**		**HIGHLY ACCEPTABLE**	

As presented in the Table, rigidity of the Innovative Portable Router trainer, comforts in using the portable router trainer, safeness, and durability of the portable router trainer are described as Highly Acceptable by both the experts and students with the weighted mean of 4.80 and 4.50; 4.60 and 4.73; 4.60 and 4.77; and 4.50 and 4.55 respectively. The Average weighted mean of 4.63 and 4.64 of both experts and students are described as Highly Acceptable.

This means that the Extent of Acceptability of the Innovative Portable Table Router trainer in terms of ergonomics met the technical requirements for the construction that could reflect the rigidity, durability, comfort, and safeness of the Interior Design Technology shop as a new innovated device for furniture and cabinet making.

This implies further that the presence of the Innovative Portable Table Router Trainer as a new device in IDT shops would be strong, rigid, and safe trainer that could improve the performance of the students.

Construction

The construction was focused enough on the time frame, proper usage of tools and machine, safety habits being applied, proper housekeeping of the working area, quality of the finished portable table router trainer, feasibility of steps of operations, appropriateness of machine scheduling, preparation of machine and accessories, and availability of tools and equipment.

Table 7 shows the extent of acceptability of the Innovative Portable Table Router trainer in terms of construction as rated by both the experts and students.

As shown in Table7, the time frame is enough, and proper usage of tools and machine, safety habits are being applied, proper housekeeping of the working area, quality of the finished portable table router trainer, steps of operations are feasible, machine scheduling is appropriate, preparation of machine and accessories, and availability of tools and equipment are described as Highly Acceptable by both the experts and students the with the weighted mean of 4.90

Table 7

Extent of acceptability of the Innovative Portable Table Router Trainer in terms of construction

CONSTRUCTION	**ACCEPTABILITY THE CONSTRUCTED PORTABLE TABLEROUTER**			
	FACULTY (n = 10)		**STUDENTS (n = 22)**	
	X	**VD**	**X**	**VD**
Construction time frame is enough	**4.90**	HA	**4.36**	HA
Proper usage of tools and machine	**4.80**	HA	**4.82**	HA
Safety habits is being applied	**4.50**	HA	**4.82**	HA
Proper housekeeping of the working area	**4.60**	HA	**4.68**	HA
Quality of the finished portable router trainer	**4.60**	HA	**4.45**	HA
Steps of operations are feasible	**4.60**	HA	**4.50**	HA
Machine scheduling is appropriate	**4.70**	HA	**4.55**	HA
Preparation of machine and accessories	**4.80**	HA	**4.64**	HA
Availability of tools and equipment	**4.70**	HA	**4.73**	HA
AVERAGE WEIGHTED MEAN	**4.69**		**4.62**	
INTERPRETATION	**HIGHLY ACCEPTABLE**		**HIGHLY ACCEPTABLE**	

and 4.82; 4.60 and 4.68; 4.60 and 4.45; 4.60 and 4.50; 4.70 and 4.55; 4.80 and 4.64; and 4.70 and 4.73 respectively. The Average weighted mean of 4.69 and 4.62 of both experts and students are described as Highly Acceptable.

This means that the Extent of Acceptability of the Innovative Portable Table Router trainer in terms of construction met the technical requirements that could be very much needed in the Interior Design Technology shop as a new innovated device for furniture and cabinet making.

This implies further that the Innovative Portable Table Router Trainer as a new device in IDT shops would lessen the scarcity of the necessary tools and equipment.

Table 8 displays the summary of the extent of acceptability of the Innovative Portable Table Router trainer as rated by both the experts and students.

Table 8
Summary Table on the extent of acceptability of the Innovated Portable Table Router trainer

ACCEPTABILITY OF THE PORTABLE TABLE ROUTER TRAINER	FACULTY		STUDENTS	
	AVERAGE WEIGHTED MEAN	VD	AVERAGE WEIGHTED MEAN	VD
DESIGN	4.68	HA	4.70	HA
ERGONOMICS	4.63	HA	4.64	HA
CONSTRUCTION	4.69	HA	4.62	HA
AVERAGE WEIGHTED MEAN	**4.67**		**4.65**	
INTERPRETATION	**HIGHLY ACCEPTABLE**		**HIGHLY ACCEPTABLE**	

As displayed in the Table8, the extent of the acceptability of the Innovated Portable Table Router Trainer in terms of design, ergonomics, and construction, is described by both the experts and the students as Highly Acceptable with the weighted mean of 4.68 and 4.70; 4.63 and 4.64; and 4.69 and 4.69 respectively. The average weighted mean of both experts and students is 4.67 and 4.65 which is described as Highly Acceptable.

This means that the portable table router trainer met the quality standards that lead a very good performance of the students.

It implies that the trainer can help the IDT instructors and professors in the delivery of their knowledge and skills in relation to furniture and cabinet making.

Extent of Effectiveness of the Innovated Portable Table Router Trainer

The Innovated Portable Table Router trainer was rated by the experts on the extent of effectiveness as to its functions in terms of lapping, mortising, dovetailing, rabbeting, and molding. The aforementioned functions have the same indicators such as quality of the work, neatness of surface, squareness of the corner, accuracy of measurements, smoothness of surface, and safeness upon using the trainer.

Lapping

Lap joint left to right: half lap, mitered half lap, cross lap and dovetail lap

Lapping is one of the functions of the Portable Table Router trainer that of joining pieces of wood by overlapping them either full or half of its thickness. The functions were evaluated as to the quality of work, neatness of the surface, squareness of the corner, accuracy of measurements, smoothness of the surface, and safeness upon using.

Table 9 displays the effectiveness of the portable table router trainer in terms of lapping.

Table 9
Extent of the effectiveness of Innovative Portable Table Router Trainer in terms of lapping

LAPPING	EFFECTIVENESS OF THE PORTABLE TABLE ROUTER							
	FACULTY (n = 10)							
	5 (HE)	4 (ME)	3 (FE)	2 (LE)	1 (UE)	TWP	X	VD
Quality of work	6	4	0	0	0	46	**4.60**	HE
Neatness of the surface	7	3	0	0	0	47	**4.70**	HE
Squareness of corner	6	4	0	0	0	46	**4.60**	HE
Accuracy of measurements	8	2	0	0	0	48	**4.80**	HE
Smoothness of surface	9	1	0	0	0	49	**4.90**	HE
Safeness upon using the trainer	9	1	0	0	0	49	**4.90**	HE
AVERAGE WEIGHTED MEAN	**4.75**							
INTERPRETATION	**HIGHLY EFFECTIVE**							

As displayed in Table 9, the extent of effectiveness as to its functions in terms of lapping as rated by the experts, the quality of work is described as Highly Effective with the weighted mean of 4.60; neatness of the surface is described as Highly Effective with the weighted mean of 4.70; squareness of the corner is described as Highly Effective with the weighted mean of 4.60; accuracy of measurements is described as Highly Effective with the weighted mean of 4.80; smoothness of the surface is described as Highly Effective with the weighted mean of 4.90; and safeness upon using is described as Highly Effective with the weighted mean of 4.90. The average weighted mean of 4.75 is described as Highly Effective.

This means that the Portable Table Router trainer performs the functions in terms of lapping with an outstanding performance.

It implies that the trainer is a great help to the instructors, professors, and students in making furniture and cabinet.

Mortising

Mortising is one of the functions of the Portable Table Router trainer, that of joining pieces of wood by cutting a hole on the one part and inserting the other part. The functions were evaluated as to the quality of work, neatness of the surface, squareness of the corner, accuracy of measurements, smoothness of the surface, and safeness upon using.

Table 10 shows the effectiveness of the Portable Table Router trainer in terms of mortising.

As shown in the table, the extent of effectiveness as to its functions in terms of mortising as rated by the experts, the quality of work is described as Highly Effective with the weighted mean of 4.70; neatness of the surface is described as Highly Effective with the weighted mean of 4.60; squareness of the corner is described as Highly Effective with the weighted mean of 4.70; accuracy of measurements is described as Highly Effective with the weighted mean of 4.90; smoothness of the surface is described as Highly Effective with the weighted mean of 4.50; and safeness upon using is described as Highly Effective with the weighted mean of 4.80. The average weighted mean of 4.70 is described as Highly Effective.

Table 10

Extent of the effectiveness of Portable Table Router Trainer in terms of mortising

MORTISING	EFFECTIVENESS OF THE PORTABLE TABLE ROUTER							
	FACULTY (n = 10)							
	5 (HE)	4 (ME)	3 (FE)	2 (LE)	1 (UE)	TWP	X	VD
Quality of work	7	3	0	0	0	47	**4.70**	HE
Neatness of the surface	6	4	0	0	0	46	**4.60**	HE
Squareness of corner	7	3	0	0	0	47	**4.70**	HE
Accuracy of measurements	9	1	0	0	0	49	**4.90**	HE
Smoothness of surface	5	5	0	0	0	45	**4.50**	HE
Safeness upon using the trainer	8	2	0	0	0	48	**4.80**	HE
AVERAGE WEIGHTED MEAN	**4.70**							
INTERPRETATION	**HIGHLY EFFECTIVE**							

This means that the portable table router trainer performs the functions in terms of mortising with an outstanding performance.

It implies that the trainer is a great help to the instructors, professors, and students in making furniture and cabinet.

Dovetailing

Dovetailing is one of the functions of the Portable Table Router trainer, that of joining pieces of wood by cutting the pins and tails with a trapezoidal shape. The functions were evaluated as to the quality of work, neatness of the surface, squareness of the corner, accuracy of measurements, smoothness of the surface, and safeness upon using.

Table 11 indicates the effectiveness of the Innovative portable table router trainer in terms of dovetailing.

Table 11
Extent of the effectiveness of Portable Table Router Trainer in terms of dovetailing

DOVETAILING	EFFECTIVENESS OF THE PORTABLE TABLE ROUTER							
	FACULTY (n = 10)							
	5 (HE)	4 (ME)	3 (FE)	2 (LE)	1 (UE)	TWP	X	VD
Quality of work	7	3	0	0	0	47	**4.70**	HE
Neatness of the surface	8	2	0	0	0	48	**4.80**	HE
Squareness of corner	6	4	0	0	0	46	**4.60**	HE
Accuracy of measurements	6	4	0	0	0	46	**4.60**	HE
Smoothness of surface	7	3	0	0	0	47	**4.70**	HE
Safeness upon using the trainer	7	3	0	0	0	47	**4.70**	HE
AVERAGE WEIGHTED MEAN	**4.68**							
INTERPRETATION	**HIGHLY EFFECTIVE**							

As indicated in table 11, the extent of effectiveness as to its functions in terms of dovetailing as rated by the experts, the quality of work is described as Highly Effective with the weighted mean of 4.70; neatness of the surface is described as Highly Effective with the weighted mean of 4.80; squareness of the corner is described as Highly Effective with the weighted mean of 4.60; accuracy of measurements is described as Highly Effective with the weighted mean of 4.60; smoothness of the surface is described as Highly Effective with the weighted mean of 4.70; and safeness upon using is described as Highly Effective with the weighted mean of 4.70. The average weighted mean of 4.68 is described as Highly Effective.

This means that the Portable Table Router trainer perform the functions in terms of dovetailing with an outstanding performance.

It implies that the trainer is a great help to the instructors, professors, and students in making furniture and cabinet.

Rabbeting

Rabbeting is one of the functions of the Portable Table Router trainer, that of joining pieces of wood by cutting or making a groove of the edges of the wood. The functions were evaluated as to the quality of work, neatness of the surface, squareness of the corner, accuracy of measurements, smoothness of the surface, and safeness upon using.

Table 12 shows the effectiveness of the portable table router trainer in terms of mortising.

Table 12
Extent of the effectiveness of the Portable Table Router Trainer in terms of rabbeting

RABBETING	EFFECTIVENESS OF THE PORTABLE TABLE ROUTER							
	FACULTY (n = 10)							
	5 (HE)	4 (ME)	3 (FE)	2 (LE)	1 (UE)	TWP	X	VD
Quality of work	9	1	0	0	0	49	**4.90**	HE
Neatness of the surface	9	1	0	0	0	49	**4.90**	HE
Squareness of corner	7	3	0	0	0	47	**4.70**	HE
Accuracy of measurements	8	2	0	0	0	48	**4.80**	HE
Smoothness of surface	8	2	0	0	0	48	**4.80**	HE
Safeness upon using the trainer	8	2	0	0	0	48	**4.80**	HE
AVERAGE WEIGHTED MEAN	**4.82**							
INTERPRETATION	**HIGHLY EFFECTIVE**							

As shown in Table 12, the extent of effectiveness as to its functions in terms of rabbeting as rated by the experts, the quality of work is described as Highly Effective with the weighted mean of 4.90; neatness of the surface is described as Highly Effective with the weighted mean of 4.90; squareness of the corner is described as Highly Effective with the weighted mean of 4.70; accuracy of measurements is described as Highly Effective with the weighted mean of 4.80; smoothness of the surface is described as Highly Effective

with the weighted mean of 4.80; and safeness upon using is described as Highly Effective with the weighted mean of 4.80. The average weighted mean of 4.82 is described as Highly Effective.

This means that the Portable Table Router Trainer performs the functions in terms of rabbeting with an outstanding performance.

It implies that the trainer has been a great help to the instructors, professors, and students in making furniture and cabinet.

Molding

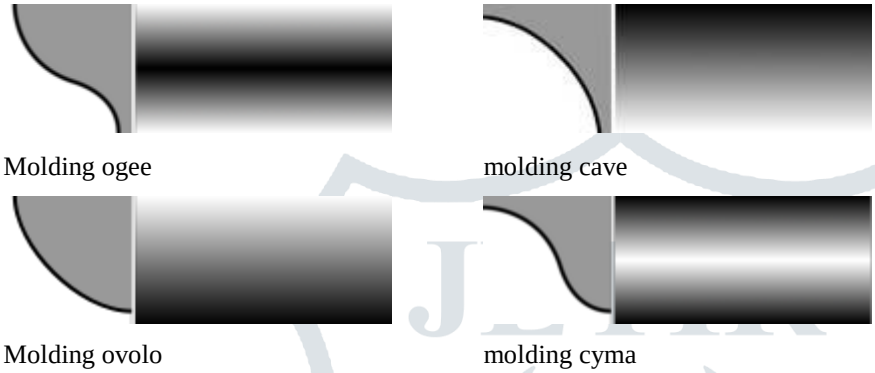

Figure 8. Molding Guide

Molding is one of the functions of the Portable Table Router trainer, that of cutting or making a groove or any design of the edges of the wood. The functions were evaluated as to the quality of work, neatness of the surface, squareness of the corner, accuracy of measurements, smoothness of the surface, and safeness upon using.

Table 13 displays the effectiveness of the Portable Table Router trainer in terms of molding.

As displayed in Table 13, the extent of effectiveness as to its functions in terms of molding as rated by the experts, the quality of work is described as Highly Effective with the weighted mean of 4.80; neatness of the surface is described as Highly Effective with the weighted mean of 4.60; squareness of the corner is described as Highly Effective with the weighted mean of 4.80; accuracy of measurements is described as Highly Effective with the weighted mean of 4.70; smoothness of the surface is described as Highly Effective with the weighted mean of 4.50; and safeness upon using is described as Highly Effective with the weighted mean of 4.60. The average weighted mean of 4.67 is described as Highly Effective.

Table 13
Extent of the effectiveness of Innovative Portable Table Router Trainer in terms of molding

MOLDING	**EFFECTIVENESS OF THE PORTABLE TABLE ROUTER**							
	FACULTY (n = 10)							
	5 (HE)	4 (ME)	3 (FE)	2 (LE)	1 (UE)	**TWP**	**X**	**VD**
Quality of work	8	2	0	0	0	48	**4.80**	HE
Neatness of the surface	6	4	0	0	0	46	**4.60**	HE

Squareness of corner	8	2	0	0	0	48	**4.80**	HE
Accuracy of measurements	7	3	0	0	0	47	**4.70**	HE
Smoothness of surface	5	5	0	0	0	45	**4.50**	HE
Safeness upon using the trainer	6	4	0	0	0	46	**4.60**	HE
AVERAGE WEIGHTED MEAN	**4.67**							
INTERPRETATION	**HIGHLY EFFECTIVE**							

This means that the Innovative Portable Table Router trainer perform the functions in terms of molding with an outstanding performance.

It implies that the trainer is a great help to the instructors, professors and students in making furniture and cabinet.

Table 14 reveals the summary on the extent of effectiveness of the Innovative portable table router trainer.

Table 14
Summary table on the extent of the effectiveness of Innovative Portable Table Router trainer

EFFECTIVENESS OF THE PORTABLE TABLE ROUTER TRAINER	**FACULTY**	
	AVERAGE WEIGHTED MEAN	**VD**
LAPPING	4.75	HE
MORTISING	4.70	HE
DOVETAILING	4.68	HE
RABBETING	4.82	HE
MOLDING	4.67	HE
AVERAGE WEIGHTED MEAN	**4.72**	
INTERPRETATION	**HIGHLY ACCEPTABLE**	

As shown in Table 14, the extent of effectiveness as to its functions as rated by the experts, lapping is described as Highly Effective with the weighted mean of 4.75; mortising is described as Highly Effective with the weighted mean of 4.70; dovetailing is described as Highly Effective with the weighted mean of 4.68; rabbeting is described as Highly Effective with the weighted mean of 4.82; and moulding is described as Highly Effective with the weighted mean of 4.67. The average weighted mean of 4.72 is described as Highly Effective.

This means that the Innovative Portable Table Router Trainer performs its functions with an outstanding performance.

It implies that the trainer has been a great help to the instructors, professors, and students in making furniture and cabinet and to the University for acquiring this kind of trainer as an innovative device for instruction.

Test for the significant mean difference between the perceptions of the respondent groups towards the acceptability of the constructed portable table router trainer

In testing for the significant difference, t – test was used. Average weighted mean and standard deviation were computed and recorded.

Table 15 reveals the significant mean difference between the perceptions of the respondent groups on the acceptability of the constructed Innovative Portable Table Router trainer.

Table 15
Test for the significant mean difference between the perceptions of the respondent groups towards acceptability of the trainer

Perception of the Respondents	**Faculty** (N=10)		**Students** (N=22)		**Computed t-value**	**Critical t-value** α=0.05 two tailed test	**Decision**
	X_1	SD_1	X_2	SD_2			
Acceptability of the Trainer	4.67	0.13	4.65	0.15	0.36	2.04	Do not reject Ho

As revealed in Table 15, the result on the Significant Mean Difference between the perceptions of the respondent groups towards the acceptability of the Innovative Portable Table Router trainer shows that the perception of the experts has a weighted mean of 4.67 with the standard deviation of 0.13; the perception of the students has a weighted mean of 4.65 with the standard deviation of 0.15. The computed t-value is 0.36 lesser than the critical t-value of 2.04 at alpha level of 0.05, two tailed test. Therefore, the null hypothesis, which states: "There is no significant mean difference between the perceptions of the respondents group towards the acceptability of the trainer", is accepted.

This means that both the experts and the students have the same perceptions on the acceptability, hence the trainer is Highly Acceptable and based on their perceptions there can be a good implication on it.

This implies that the quality instruction can be given by the respective instructors and professors through innovations of a new device and resourcefulness.

Instructional Guide

The Instructional Guide relates to the composition of ideas, principles, skills and knowledge. It is a logical sequence of steps and procedures that the user and the trainer will rely on.

This guide is composed of two parts: The Pictorial Views with labeled parts of the trainer and The Operation Manual. The operation manual is the guide in performing the functions of the trainer. It has the list of operation with the corresponding steps necessary in its functions. It applies the basic skills such as: Planning and organizing basic ideas, reading and understanding technical drawing, work concepts on scale,

accuracy, efficiency, and housekeeping, handling of tools, machines, and equipment, knowledge of the availability of the materials needed in the locality, work techniques, and work safety.

Final Output

The figure 9 is the final image of the Innovated Portable Table Router Trainer.

Figure 9. Innovated Portable Table Router Trainer

FINDINGS

The findings of the study are the following: There were three phases of the study: the development of the trainer, the evaluation of its level of acceptability, and the significant difference of the perceptions of the respondent groups on the acceptability of the trainer.

In the development of the trainer, a technical plan was made by the researcher. It was then used for the presentation. The construction materials of the trainer are all available in the market and some were recycled from the shop. The technical requirements were prepared and complied.

The level of acceptability of the Innovative Portable Table Router Trainer in terms of its design as rated by the experts and students is both Highly Acceptable with the average weighted mean of 4.68 and 4.70. In terms of ergonomics it is also Highly Acceptable with the average weighted mean of 4.63 and 4.64. In terms of construction it is also Highly Acceptable with the average weighted mean of 4.69 and 4.62. The average weighted mean on the acceptability of the trainer is 4.67 and 4.65 of both experts and students who described it as Highly Acceptable.

The effectiveness of the Innovated Portable Table Router Trainer with its functions in terms of lapping as rated by the experts is described as Highly Effective with the weighted mean of 4.75. In terms of mortising it is described as Highly Effective with the weighted mean of 4.70. In terms of dovetailing it is described as Highly Effective with the weighted mean of 4.68. In terms of rabbeting it is described as Highly Effective with the weighted mean of 4.82. In terms of molding it is described as Highly Effective with the weighted

mean of 4.67. The average weighted mean on the effectiveness of the trainer is 4.72 which is described as Highly Effective.

The test of significant mean difference between the perceptions of the respondent groups on the acceptability of the trainer shows that the computed t-value is 0.36 lesser than the critical t-value of 2.04 at alpha level of 0.05, two tailed test. Therefore, the null hypothesis, Ho: "There is no significant mean difference between the perceptions of the respondents group on the acceptability of the trainer", is accepted. So, both the experts and the students have the same perceptions on the acceptability of the Portable Table Router trainer.

CONCLUSION

Based on the findings and after a careful analysis and interpretation of the study, it is concluded that the Innovative Portable Table Router Trainer meets the standards and is very functional in performing each functions for IDT instructions.

RECOMMENDATION

It is recommended that the Innovative Portable Table Router Trainer and the User's Guide be adopted.

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