Innovating Area and Volume Measurement Through the Development and Assessment of XYZ Laser Scaler

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Abstract- This study aims to innovate area and volume measurement through the development and assessment of XYZ laser scalers. It looks up to innovative devices powered and made in automated machines that can be used in distance measurement, area, and volume calculation in the building and construction industry and other related works. The data were gathered from the respondents comprising construction foreman, electrical instructors, and electrical engineering and technology students Baler, Aurora. The result of the study revealed the XYZ laser scaler development by the modified Hannifin and peck model and assessment of it in terms of materials, design, built quality, performance, durability, functionality, usability, and effectiveness set by construction foreman, electrical instructor, electrical engineering and technology student was highly usable materials, high-quality design, high build quality, very efficient, highly durable, highly functional, highly usable and very effective. The researcher went to different construction companies to explain to the building and construction workers, especially the construction foreman, what the device is all about and how it can help to increase the quality of work in terms of distance measurement, area, and volume measurements. The level of the effectiveness of the implementation of the XYZ laser scaler set by the construction foreman, electrical instructor, electrical engineering, and technology student was found to be very effective which met the intended purpose in full intention of the indicators.

Indexed Terms- Development, assessment, XZY laser scaler, construction foreman, electrical instructors, electrical engineering and technology student.

I. INTRODUCTION

The precise measurement of area and volume is fundamental to a wide array of fields, from architecture and engineering to environmental science and manufacturing. Accurate quantification of these spatial dimensions underpins critical decision-making processes, quality control, and scientific investigations. The emergence of advanced measurement technologies has continually reshaped our ability to meet these demands, and at the forefront of this evolution is the XYZ Laser Scaler— a revolutionary instrument poised to redefine the approach to spatial measurement.

In a world increasingly reliant on technology and automation, the need for efficient, reliable, and precise measurement tools has never been more pronounced. Traditional measurement techniques, while valuable, often suffer from limitations such as human error, labor-intensive procedures, and subjectivity. The XYZ Laser Scaler represents a pioneering solution to these challenges, combining laser-based distance measurement with cutting-edge computational algorithms to assess the area and volume of objects and spaces swiftly and accurately.

The primary aim of this study is to provide an in-depth examination of the XYZ Laser Scaler, exploring its development process, underlying principles, and its performance in various real-world scenarios. Through assessment and validation, the researcher aims to establish its accuracy, reliability, and versatility in comparison to existing measurement techniques. Furthermore, potential areas for improvement was investigated, and the implications of its integration into various industries and scientific disciplines were explored.

This study provides an extensive examination of the XYZ Laser Scaler for area and volume,

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encompassing its development process, theoretical foundations, and practical performance across diverse real-world applications. Thus, the study aims to establish the accuracy, reliability, and versatility of this instrument when compared to traditional measurement methods. Furthermore, potential avenues for refinement were explored, and the far-reaching implications of its integration into various industrial sectors and scientific disciplines were investigated.

II. RESEARCH AND COLLECT IDEA

Conceptual Framework
Nowadays, measurement is significant in our daily lives especially in the field of construction, it is also important to the workers although it has a process that can be critical. The researcher seeks to develop a more convenient and usable product to use in scale measurements that is beneficial to the building and construction field. The researcher innovated an Area and Volume Measurement through the Development and Assessment of XYZ Laser Scaler, a device that can be a useful apparatus in any activity that needs a measurement and development/implementation. At the conclusion of each phase, the model undergoes stages of evaluation and revision before progressing to the next phase, rendering it an ongoing and iterative model. While it may not be specifically designed for novices, its emphasis on constraints related to quality and complexity makes it practical and appealing (Prezi, n.d.).

The Hannafin-Peck Model encompasses three phases: needs assessment, design, and development/implementation. At the conclusion of each phase, the model undergoes stages of evaluation and revision before progressing to the next phase, rendering it an on-going and iterative model. While it may not be specifically designed for novices, its emphasis on constraints related to quality and complexity makes it practical and appealing (Prezi, n.d.).

The researcher modified the model Hannafin-Peck Model that is suitable for the research study, in the first phase, needs assessment for the problems and measurements of the gap in traditional and the XYZ laser scaler in terms of planning and answering

questions about how XYZ laser scaler is applicable and useful for area and volume.

In the second phase, Construction Foreman, Electrical Instructors, Electrical Engineering, Industrial Technology students provided their ratings and feedback on the XYZ laser scaler for area and volume. The design phase encompasses design materials, construction, and evaluation, requiring a systematic and specific approach. Systematic implies a logical and orderly method of identifying, developing, and evaluating planned strategies to achieve project goals. Being specific entails executing each element of the instructional design plan with meticulous attention to detail.

In the third phase, the XYZ laser scaler for area and volume was developed by the Construction Company, involving collaboration with Construction Foreman, Electrical Instructors, Electrical Engineering, Industrial Technology students. The project underwent thorough review and revision based on received feedback. The evaluation phase consists of assessments by the Construction Company, electrical practitioners, and Electrical Engineering and Industrial Technology Students. This structured approach ensures a comprehensive and iterative development process for the XYZ laser scaler, enhancing its functionality and usability.

In the fourth phase, is a practical application and assessment of XYZ laser scalar measurement in its implementation in the Building and Construction that also applies Evaluation among the respondents who are knowledgeable in the study.

Research Problem
This study aimed to innovate the area and volume measurement through the development and assessment of XYZ laser scaler that may help practitioners in construction, specifically the foreman workers in their field that maintain efficient and quality works in terms of building and construction.

1. How may the XYZ laser scaler device be described in terms of the following:
1.1   needs assessment
1.2   design, development and testing;
1.2.1   detailed drawing

1.2.2   materials and construction
1.2.3   cost and benefit analysis
1.3   implementation and evaluation phase
1.3.1 quality assessment of the device?

2. How may the XYZ laser scaler device be assessed and evaluated by foreman of construction companies in Baler, Aurora, electrical instructor, electrical engineering and technology student in terms of its qualities in the following:
    2.1. materials;
    2.2. design;
    2.3. built quality;
    2.4. performance; and
    2.5. durability?

3. How may the level of applicability of XYZ laser scaler device be assessed by construction foreman in Baler, Aurora, electrical instructors, electrical engineering, and Industrial technology student at Aurora State College of Technology in terms of its use in the following:
    3.1. functionality;
    3.2. usability; and
    3.3 effectiveness

4. Is there a significant difference in the evaluation of building and construction foreman in Baler Aurora, Electrical instructors, and Electrical engineering, and Industrial Technology student at Aurora State College of Technology?

5. What is the level of effectiveness in the implementation of the developed device ?

Scope and Delimitation
The study of innovative area and volume measurement through the development and assessment of XYZ laser scaler was conducted in the Year 2023-2024. The XYZ laser scaler focuses on the scope of works in building and construction specifically on scaling. The researcher aims to utilize the product for measuring length, width, and height, as well as determining the area and volume. The device uses Arduino Mega as the brain of the system, an ultrasonic sensor for sensing the distance, laser beam for the guide. The body of the XYZ laser scaler is made of acrylic plastic that is not easily damaged when used in the field. The maximum measurement

for length is 8 meters, width is 8 meters and height measurement is 6 meters only. The program was uploaded into the Arduino board using a computer to enable the functioning of the XYZ laser scaler for area and volume. The XYZ laser scaler scaling capacity for area is sixty-four square meters (64 sqm) and for volume is Three hundred sixty-four cubic meters (364 cum), the XYZ laser scaler is for the area of square and rectangle shapes and volume for rectangular prism measurement only. Cones, triangular and other shapes of floor areas are not included in the capacity of the device.

The study focused on the importance and effectiveness of innovating area and Volume Measurement through the Development and Assessment of XYZ Laser Scaler. This study is conducted in the process of measurement in building and construction in Baler, Aurora. The data collection involved Construction Foreman of Baler, Aurora, Electrical Instructors, Electrical Engineering, and Industrial Technology students at Aurora State College of Technology.

Research Design
The study employed a developmental research method, specifically focused on designing, developing, and evaluating a device – the XYZ laser scaler for area and volume. This approach aimed to produce a new and improved product, systematically addressing internal consistency and effectiveness criteria (Richey & Klein, 2014).

The researcher developed the XYZ laser scaler to assess its efficiency and utility in comparison to traditional area and volume scaling materials available in the market. The main components of the scaler included a laser, ultrasonic sensor, and Arduino UNO board, serving as the central controller. The Arduino UNO board functioned as the heart and brain of the XYZ laser scaler, powered by a 12V DC rechargeable battery. The scaler's body is square-shaped and constructed from lightweight acrylic plastic to facilitate easy handling and maneuverability. It is designed for direct measurement of small to medium-sized floor areas, providing data on length, width, and height volume calculations.

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Locale of the Study

The research was conducted during the year 2023-2024 on selected Construction Foremen in Baler, Aurora, and electrical instructors, Electrical Engineering, and Industrial Technology students at Aurora State College of Technology in Brgy. Zabali, Baler, Aurora. This locale was chosen due to its significance as a hub for numerous workers and students knowledgeable in the technology employed by the XYZ laser scaler for area and volume.

The selection of Baler, Aurora, was based on its strategic position as a center for both skilled workers and students specializing in relevant technologies. This locale provided an ideal setting for the research, as it offered access to a diverse pool of participants with expertise in the field of construction and electrical engineering. Furthermore, the presence of Aurora State College of Technology ensured a readily available cohort of students and instructors who could provide valuable insights and perspectives on the use and potential applications of the XYZ laser scaler.

Respondents

The respondents of the study were chosen by the researcher because they are knowledgeable to answer questions about the researcher scope of the study.

The respondents for this study were selected from various groups. Ten (10) electrical engineering and technology instructors from the Schools of Engineering and Industrial Technology at Aurora State College of Technology represented the academic perspective. They were selected based on their length of teaching experience, knowledge and skills in using modern and traditional measuring devices and expertise in teaching subjects related to measurements. Additionally, ten (10) Construction Foreman were chosen from workers in the building and construction industry because their expertise in the field of construction was highly recommended as respondents for distance measurement instruments. They were selected based on their more than five years of experience in the construction work and their knowledge in using traditional and modern measuring device. The student respondents included seventy (70) individuals enrolled at Aurora State College of Technology. programs. Selected students were electrical engineering and industrial technology who are third year level equipped with skills and knowledge in using traditional and modern device for measurements.

The researcher employed a purposive sampling method to selected respondents. This non-probability sampling technique involves the researcher's judgment in choosing participants based on specific criteria. The purposive sampling method is deemed suitable because not all construction Foreman possess knowledge of the embedded technology classified and used in the XYZ laser scaler.

Through purposive sampling, samples were drawn from the pool of Construction Foremen at Baler Aurora, electrical instructors, electrical engineering, and Industrial technology students at Aurora State College of Technology. This approach ensured that the selected respondents have relevant knowledge and experience related to the technology employed in the XYZ laser scaler.

Table 1: *Population per Group of Expert.*

Respondents Classification	Number	Percentage
Construction Foreman (Building and Construction)	10	11.11%
Electrical Instructors (ASCOT Instructors)	10	11.11%
Electrical engineering and industrial technology (ASCOT 3rd year Students)	70	77.77%
TOTAL	90	100%

Data Analysis Techniques
To interpret the data of the level of the applicability of the XYZ laser scaler by the building and construction worker in terms of its measurement used, weighted mean was used.

To interpret the data of the assessment of the XYZ laser scaler by Construction Foremen, Electrical Instructors, Electrical engineering and Technology students in terms of its instructional qualities, the weighted mean was used.
The evaluation that was used in the quality assessment of the device was based on a criterion of Materials, Design, Built Quality, Performance, Durability, Functionality, Usability and Effectiveness The data gathered was interpreted using the scoring guide:

Response Mode
Based on the scope and delimitation of the innovating area and volume through the development and assessment of the XYZ laser scaler, The evaluation tool that was used in the quality assessment of the device was, (1) materials, if used in the XYZ laser scaler, is appreciated in the device, (2) design if the drawing and schematics wiring of the device is good

and working for scaling, (3) built quality if the building of the device is built-in quality, (4) performance if the device XYZ laser scaler can perform in the specific function intended, (5) durability if the device XYZ laser scaler can long last in using in building and construction, (6) functionality if the specific materials of the XYZ laser scaler can function in measuring and calculating area and volume measurement, (7) usability if the component performs specific functions under specified conditions for a specified period, (8) Effectiveness if the XYZ laser scaler is effective in overall function and use of the device.

Data Gathering Procedure
Prior to the data collection, the researcher visited the selected construction company and school of Aurora State College of Technology here in Baler, Aurora to determine the applicability of the study of XYZ laser scaler.

With this as a reference, the researcher decided on the schools and some construction companies that are used as the locale of this study. The researcher then prepared letters asking for permission from the company owner and school heads where the researcher distributed instruments. When permission was granted, the researcher went to the respondents and explained to them the purpose of conducting the study and the importance of answering all the items truthfully and assuring them that the confidentiality of all information obtained would be protected.

Data Analysis Techniques
To interpret the data of the level of the applicability of the XYZ laser scaler by the building and construction worker in terms of its measurement used, weighted mean was used.

To interpret the data of the assessment of the XYZ laser scaler by Construction Foremen, Electrical Instructors, Electrical engineering and Technology students in terms of its instructional qualities, the weighted mean was used.

The evaluation that was used in the quality assessment of the device was based on a criterion of Materials, Design, Built Quality, Performance, Durability, Functionality, Usability and Effectiveness

The data gathered was interpreted using the scoring guide:

Table 2 *Scoring guide in the quality of the XYZ laser scaler for area and volume.*

Range	Verbal Interpretation
3.25 - 4.00	Highly Usable Materials/ High Quality Design/ High Built Quality/ Very Efficient/ Highly Durable/ Highly functional/ Highly Usable/ Very Effective/
2.50 - 3.24	Usable Materials/ Quality Design/ Built Quality/ Efficient/ Durable/ Functional/ Usable/ Effective
1.75 - 2.49	Need Improvements
1.00 - 1.74	Poor

Analysis of Variance (ANOVA) was used to determine the significant difference in the evaluation that was used in the quality assessment of the XYZ laser scaler device was based on a criterion of Materials, Design, Built Quality, Performance, Durability, Functionality, Usability, and Effectiveness of building and construction Foremen at Baler Aurora, Electrical Instructors, Electrical Engineering, and Industrial Technology students at Aurora State College of Technology.

To measure the level of effectiveness of the developed XYZ laser scaler for area and volume according to the four levels of effectiveness (highly effective, Effective, slightly effective, and poor), weighted mean was used. The level of effectiveness was interpreted using the scale below:

Table 3 *Scoring guide in the level of effectiveness of the XYZ laser scaler for area and volume.*

Range	Verbal Interpretation
3.25 - 4.00	Very Effective
2.50 - 3.24	Effective
1.75 - 2.49	Need Improvements
1.00 - 1.74	Poor

III. RESULT AND DISCUSSION

This chapter presents the analysis and interpretation of data about the innovating area and volume measurement through the development and assessment of XYZ laser scaler.

1. Innovating Area and Volume measurement Through the Development and Assessment of XYZ laser scaler according to the Phases of the modified Hannifin -Peck model

This phase comprises the four stages of the modified Hannifin -Peck model: Need Assessment, Design, Development of XYZ laser scaler, Implementation.

1.1 Need Assessment. The researcher seeks answers to the question and problem of accurate measurements regarding distance measurement, area, and volume measurement in building and construction, as the use of the latest technology is part of the research of the researcher. The researcher came up with ideas and plans by herself considering the needs of the Construction industry to have a better quality output in terms of building and construction.

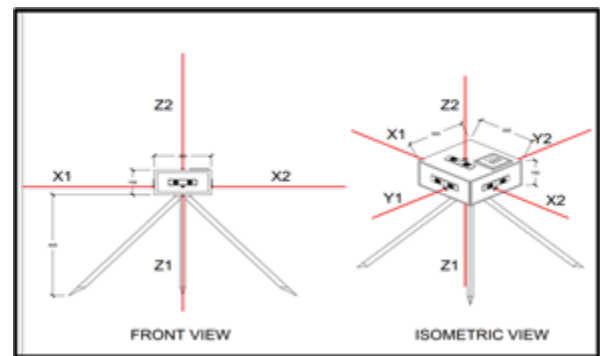1.2   Design, development and testing;
1.2.1   detailed drawing

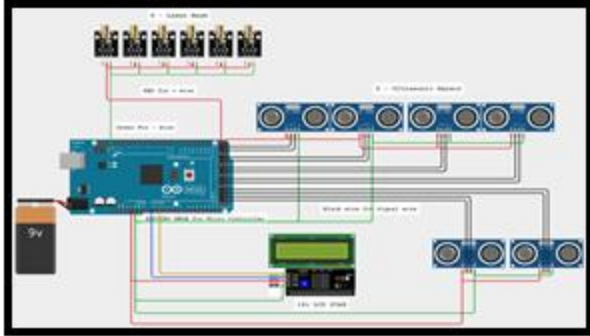Figure 3 Sample drawing of XYZ laser scale

Figure 4 Schematic diagram of XYZ laser scaler.

A wiring diagram is a visual representation of components and wires related to an electrical connection. This pictorial diagram shows us the physical links that are far easy to understand in an electrical circuit or system. One wiring diagram can signify all the interconnections, thereby signaling the relative locations. The use of a wiring diagram is positively recognizable in manufacturing or electrical troubleshooting projects. It can prevent lots of damage that even derail an electrical plan.(EdrawMax.com, 2022). Figure 4 shows the wiring diagram of the XYZ laser scaler. It shows the connection from the Microcontroller to the laser beam and the ultrasonic sensors.

1.2.2   Material and Construction

The researcher with his expertise in electrical and electronics technology chose the materials that must be used in building the XYZ laser scaler to function properly in terms of distance measurement, area, and volume calculation, by the use of the micro-processor Arduino-Uno the device can calculate itself and the use of ultrasonic sensor the device XYZ laser scaler can easily manage get the proper distance of X axis, Y axis Z axis, Laser beam for the guide of the XYZ laser scaler.

Preparing materials For Development and Assessment of XYZ laser scaler

The breakdown of materials used in the project is shown in the table below, this includes the quantity, size, price and description, specification of the materials that were used in innovating area and volume measurement through the development and assessment of XYZ laser scaler.

Table 3 *Materials and their description for XYZ laser scaler.*

Materials	Description
Arduino Mega	The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards
Ultrasonic sensor	The Ultrasonic sensor or HC-SRO4 is used to measure the distance of the object using SONAR. It emits the Ultrasound at a frequency of 40KHZ or 40000 Hz. The frequency travels through the air and strikes the object on its path.
Laser Beam	Device that emits a single static laser beam of single or multiple wavelengths - of colours.

Jumper Wires	Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.
Breadboard	Plastic block holding a matrix of electrical sockets of a size suitable for gripping thin connecting wire, component wires or the pins of transistors and integrated circuits (ICs).
Acrylic plastic	Acrylic (also known as Plexiglas®) is a clear, strong, stiff plastic. It exhibits glass-like qualities—clarity, brilliance, and transparency—but at half the weight and many times the impact resistance of glass.
Switch	Electromechanical device used to control the flow of electricity in a circuit.
9V Battery	Electric battery that supplies a nominal voltage of 9 volts. To supply power to the device function.
Hollow bars	Hollow bar is a round with hollow inside bar, use for the support of the device and also the material for stand of the XYZ laser
Bolts and Nuts	Bolts and nuts grip the materials being fastened, creating a bolt joint, with the nut also preventing axial movement cited to Essentra components. com (2021)

Construction of XYZ laser scaler for area and volume measurement.

The XYZ laser scaler was constructed by the researcher using the following step:

Figure 1 *Preparation of XYZ laser scaler*

Presentation of the material and components of the XYZ laser scaler micro controller, ultrasonic sensor, laser beam, wires and acrylic plastics for the body of the laser scaler.

Figure 2 *Lay-outing the body of the XYZ laser scaler.*

Scaling and lay-out of the body of the XYZ laser scaler, placing where the placement of the sensor, laser beam, switch button.

Figure 3 *Cutting acrylic plastic for body and mounting of component.*

Cutting acrylic plastic for the body of the device and mounting of the component of XYZ laser scaler for area and volume measurement.

Figure 4 *Wiring installation of the XYZ laser scaler.*

Wiring installation of the device and mounting the micro-controller inside the body of the XYZ laser scaler.

Figure 5 *Assembling the stand of the XYZ laser scaler.*

Assembling the stand, hollow bars for the stand of the device inserting bolts and nuts as support of the stand, and fixing gaps for stable and good balance of the device.
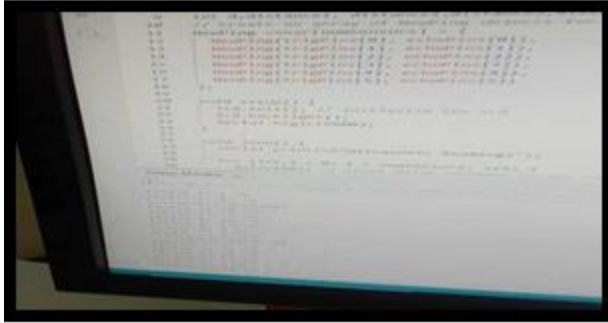
Figure 6 *Encoding of the program of the XYZ laser scaler.*

Encoding of the program of the device using Arduino IDE software.

Figure 7 *Actual testing of the functionality of the device.*

Testing of the device in actual functionality in XYZ measurement.

Cost and Benefits

Table 13 shows the breakdown of materials needed in the project together with their description, sizes, and amount or price as well cost and benefits of the XYZ laser scaler. A cost-benefit analysis is a process of comparing the projected or estimated costs and benefits (or opportunities) associated with a project decision to determine whether it makes sense from a business perspective. Generally speaking, cost benefit analysis involves tallying up all costs of a project or decision and subtracting that amount from the total projected benefits of the project or decision (Stobierski, 2019).

The table shows the breakdown of materials used. It is important to know if the XYZ laser scaler is not only advantageous in function and technology in the normal scaling material available in the market but also to compare the cost and the benefits of the device in terms of future marketability of the device.

Table 4 *Materials and their Description for the XYZ laser scaler.*

Qty.	Unit	Description	Unit Price	Total Price
1	Piece	Arduino	540	540
6	Pieces	Mega 2560	457	457
6	Pieces	Ultrasonic	290	290
30	Pieces	sensor	50	50
1	Piece	Laser Beam	90	90
3 -	Pieces	Jumper	273	273
14''x14''	Piece	Wires	50	50
1	Piece	Breadboards	110	110
1	Pieces	Acrylics	300	300
6 – 40cm	Pieces	plastics	200	200
10		Electronics switch	Total:	Php 2,360
		9v Battery		
		Hollow bars		
		Bolts and Nuts		

As shown in the table, the total amount used by the researcher to build the XYZ laser scaler prototype is ₱2,360. The current conventional laser scalers that do not have a function of computing area and volume approximately cost about ₱2,800 to ₱11,000 depending upon the brand of the laser meter (Shoppee.com 2024). It simply shows that the XYZ laser scaler is a lesser cost than the conventional measurement device in the market nowadays it is an advantage because the material used in building the prototype of the XYZ laser scaler is cheaper and has the same functions of exact measurement needed in the building and construction industry.

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

This study aimed to innovate area and volume measurement through the development and assessment of XYZ laser scalers.

1. Development the research seeks answers and solutions to the problem of accurate and reliable measurements in building and construction by using embedded technologies that are in line with nowadays, in materials the researcher picks or uses the appropriate materials to create a prototype that sets XYZ laser scaler using high-tech technology devices like microcontroller, sensor, and laser beam.

2. Assessment of the XYZ laser scaler set by the construction foreman for materials overall mean is 3.65, design is 3.6, built quality is 3.8, performance is 3.83, and lastly, durability is 3.76 which results of and indicate of Highly Usable Materials, High-Quality Design, High Built Quality, high efficiency, and highly durable.

Assessment of the XYZ laser scaler set by the electrical instructors for materials overall mean is 3.97, design is 3.6, built quality is 3.8, performance is 3.86, and lastly, durability is 3.8 which result of and indicates Highly Usable Materials, High-Quality Design, High Built Quality, high efficiency, and highly durable.

Assessment of the XYZ laser scaler set by the electrical engineering and technology student for materials overall mean is 3.9, design is 370, built quality is 3.79, performance is 3.82, and lastly, durability is 3.70 which result of and indicates Highly Usable Materials, High-Quality Design, High Built Quality, high efficiency, and highly durable.

3. Assessment of the level of applicability of the XYZ laser scaler by the construction foreman for the functionality of the device has an overall mean of 3.85, usability is 3.9, and lastly, effectiveness is 3.86 which indicate all the parameters were highly functional, highly usable and very effective which met the intended purpose in the full intention of the indicators.

Assessment of the level of applicability of the XYZ laser scaler by the electrical instructors for the functionality of the device has an overall mean of 3.92, usability is 3.85, and lastly, effectiveness is 3.98 which indicate all the parameters were highly functional, highly usable and very effective which met the intended purpose in the full intention of the indicators.

Assessment of the level of applicability of the XYZ laser scaler by the electrical engineering and technology student for the functionality of the device has an overall mean of 3.91, usability is 3.85, and lastly, effectiveness is 3.92 which indicate all the parameters were highly functional, highly usable and very effective which met the intended purpose in the full intention of the indicators.

4. The findings from the ANOVA results highlight notable differences in how various qualities of the XYZ Laser Scaler are perceived by different groups. Specifically, the materials used in the device show significant variance in ratings, as indicated by a p-value of .001 and an F-statistic of 7.205. This suggests that instructors are more satisfied with the materials compared to foremen and students. In contrast, the qualities of Design, Built Quality, Performance, Durability, Functionality, Usability, and Effectiveness did not show statistically significant differences among the groups, as all these p-values were above the .05 threshold. This uniformity in perceptions suggests a general agreement or satisfaction with these aspects of the XYZ Laser Scaler across different user groups.

5. The level of effectiveness of the Construction foreman, Electrical Instructor, Electrical engineering and Technology student, results for the level of effectiveness of XYZ laser scaler is 3.86, 3.98, and 3.92 respectively, which means that the prototype is highly effective. The p-value of .254, and an F-statistic of 1.392 indicates that there is no significant difference among the three groups of respondents in terms of effectiveness of the device.

6. This research is an opportunity to gain knowledge and seek answers to the question and problem of building and construction, and other related work that involves accurate measurement, calculation

of exact areas and volume. Also, the XYZ laser scaler can be an instructional material for better understanding of the technology nowadays including micro-processors and embedded technology.

CONCLUSION

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

1. The Innovating area and volume measurement through XYZ laser scaler filled and answered the issues and problems in distance measurement, area, and volume calculation in building and construction as the aforementioned in scope and delimitation material used in building the device XYZ laser scaler fulfill the intended function, The development of XYZ laser scaler base on material and construction is appropriate to build a useful device that can help in the building and construction industry.

2. The findings of the assessment of an XYZ laser scaler were Highly Usable Materials, High-Quality Design, and High Built Quality set by the Construction Foreman, Electrical Instructors, and Electrical Engineering and Technology student which met the intended full intention of the indicators. The findings of the assessment level of the applicability of the XYZ laser scaler were highly functional, highly usable, and very effective set by the construction foreman, electrical instructor, electrical engineering, and technology which met the intended purpose in the full intention of the indicators.

3. Based on the data findings of the analysis of variance the materials category only has a difference in rating. It indicates that most of the electrical instructors are more satisfied with the materials compared to the construction foreman and electrical engineering and technology students. While on the other categories design, built quality, performance, durability, functionality, usability, and effectiveness did not show significant differences among the groups.

4. Based on the summary of findings for the level of effectiveness of the Construction foremen, Electrical Instructor, Electrical engineering, and Technology student, the result was highly effective, which means that the prototype is

highly effective in capturing exact distance measurement and calculating area and volume measurement.

5. The researcher sees the big advantage of the study to the technical-vocational learners based on the findings because it's an opportunity to gain knowledge and seek answers to the question and problem of building and construction, and other related work that involves accurate measurement, calculation of exact areas and volume. Also based on the findings of the study the XYZ laser scaler also can be instructional material for a better understanding of the technology nowadays including micro-processors and embedded technology.

RECOMMENDATIONS

Based on the results of the study and the conclusion drawn, the researcher strongly recommends the following:

1. The XYZ laser scaler device materials are appropriate for the intended function of the device to scale and calculate the area and volume it is recommended by the construction foreman, electrical instructor, electrical engineering, and technology student to use in the field in building and construction, also if there is possible to strengthen the range of the device is advisable.

2. The XYZ laser scaler design and build quality of the device is high-quality design and high quality, it is recommended by the construction foreman, electrical instructor, electrical engineering, and technology student that if there is a more appropriate and other specific design that can be developed the XYZ laser scaler is recommended for future development of the device.

3. In terms of the functionality and usability of the XYZ laser scaler it is recommended that it is possible to add more functions of the XYZ laser scaler like level and alignment measurement for better usage of the XYZ laser scaler is much better for future development.

4. Based on the findings of the test in analysis of variance the electrical instructors are more satisfied with the materials compared to construction and electrical engineering and technology students It is recommended more explanation of the technology used in the XYZ

laser scaler, execute training, and seminar about embedded technology that has XYZ laser scaler is equip.

5. The level of effectiveness of the XYZ laser scaler is very effective based on the Construction foreman, electrical instructor, and electrical engineering and technology student in the building and construction field of work it is recommended to be commercialized for the construction industry to lessen errors and rework of the workers of the building and construction industry.

6. The XYZ laser scaler is recommended by the researcher aside from building and construction it can be an instructional material for the student of electrical engineering and technology because it is equipped with a microprocessor, sensor, and other latest materials that involve embedded technology, it is an advantage to the learner of the related subject in the engineering and technology student to know this kind of technology.

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