

Streamlined System for Innovated Square Bar Twister

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Abstract:

The research was conducted at Subangdaku Technical Vocational School South District Mandaue City Division, Mandaue City, to innovate Square Bar Twister and determine its acceptability and effectiveness during the academic year 2022-2023 and of the student respondents who were 52.00%, belonged to 17 to 18 years old, males of the teacher respondents who were 40.00% belonged to 31-40 years old, male, with Masteral units. They have been in the service for 1 to 10 years and attended 3 to 5 days of training with relevant instructions and skills. On the technical requirements of the innovative square bar twister, the four requirements are Design Features, Functions, Ergonomics, and Safety are Highly Acceptable. On the extent of the acceptability of the device ease of use of the innovated square bar twister, the four-acceptance requirements are Usefulness, Ease of Use, Behavioral Intention to Use, and Actual System Use are also Highly Acceptable as perceived by the respondent groups. There is a significant impact between the respondent's perception and the acceptability and effectiveness of the innovated square bar twister. It is recommended that the Innovated Square Bar Twister and the User Manual be adopted and practiced for the safety of the end users. The Innovated Square Bar Twister also focuses on things specially designed to exist and fitted to job-related metal works and for contest activities. This will help students to make work easier, faster, and more accurate.

Keywords: Master of Science in Industrial Technology, User's Manual, Innovated Square Bar Twister, Mandaue City

Introduction:

Welding is an essential division of many industries, including automotive, construction, and aviation. Many buildings, gates, fences, small kitchen appliances, vehicles, and even space travel would not exist without this metalwork.

Shielded Metal Arc Welding (SMAW), flux-shielded arc welding, or stick welding is where the arc is struck between an electrode flux-coated metal rod and the workpiece. The rod and the workpiece's surface melt to create a weld. SMAW can be used on a wide range of metal types and thicknesses. It is frequently used for heavy-duty work that requires industrial iron and steel, such as carbon steel and cast iron, as well as low- and high-alloy steels and nickel alloys. SMAW is used in a wide range of industries.

According to American Welding Society President David McQuaid, the United States will require more than 400,000 welding professionals by 2025. While there has long been a shortage of welders, the estimated extent of the shortage has grown significantly in recent years. According to a study presented at Emsi, the link between welding and economic strength will continue to keep educated welders in high demand. This means that if someone is interested in this industry and its possibilities, now is an excellent time to begin a welding training program and become certified as a welder.

According to Philippine Welding Fabrication Industry, welding in the Philippines is a critical enabling technology for various industries predominated by metals. The process of joining metals has become more sophisticated and is now more focused on adding value to welded products needed by most industries. In recent years, welding has become a center of attention in the metalworking sector as the processes involved in welding activities are more intricate compared to other industries with more extensive machine operations. Welding processes depend more on human judgment to ensure the quality of welded products, thus requiring welders to have higher technical capabilities. Since the welding process is knowledge-based, innovation is vital for the industry's growth.

Welding jobs are more expensive in developed countries; thus, the need to outsource welding jobs from countries with emerging economies like the Philippines has become widespread. While the capability of the local welding fabrication industry becomes subject to assessment to see if the demands for welding services and products are met, the information on its productivity has minimal reports and analysis in the past.

DepEd includes the study of SMAW to grade 7-10 learners. This exploratory and introductory course leads to a Shielded Metal Arc Welding National Certificate Level II (NC II). It covers four common competencies that the Grade 7/Grade 8 Technology and Livelihood Education (TLE) student should possess: using tools, equipment, and paraphernalia; performing mensuration and calculation; practicing Occupational Health and Safety (OHS) procedures; and interpreting technical drawing and plans. This was also in TVL, a specialization course leading to a SMAW Certificate Level I (NC I). It covers one core competency a high school student should possess: performing fillet welding on carbon steel plates.

Mandaue City is one of the leading divisions of the region. In adherence to the DepEd Order, selected schools offered SMAW to their learners. One of these schools is the Subangdaku Technical Vocational School. All grade levels had SMAW in exploratory, specialization, and even senior high school studies. It was observed that the equipment/materials used, supply, and availability were limited. Traditional practices were introduced and used, but it was observed that it takes more time for teachers and learners to design the twisted square bars well.

In response to this situation, the researcher conceptualizes and fabricates the modernized square bar twister at Subangdaku Technical Vocational School, which can produce a time and energy-saving, more straightforward, more efficient, and more effective tool to do the job in the context of safe fabrication of the device in the school/classroom shops. With the contribution of this device, ease of handling and maximization of time. The functions of the device are partly described. This can be used in SMAW exercises and contests in the laboratory.

Literature Review:

The K to 12 curriculum in the Philippines incorporates Technical-Vocational Livelihood (TVL) courses aligned with Training Regulations (TR) issued by TESDA, which grants students competency certifications (NC I and NC II) after passing TESDA assessments (Callao, 2021). These certifications enhance employability in fields such as agriculture, electronics, trade, and construction. Despite the long-term benefits of the K to 12 program, challenges persist, necessitating a review of issues encountered by Grade 12 students in TVL classes. Such an investigation would allow schools to allocate resources effectively based on student needs.

The study is grounded in the Skill Acquisition Theory, which states that adults acquire skills through explicit learning processes, transitioning into implicit processes with practice (Dekeyser, 2007; Callao, 2021). Additionally, Sternberg's (1986) Human Intelligence Triarchic Theory links intelligence to contextual, componential, and two-facet sub-theories, emphasizing the impact of students' learning styles and cognitive abilities on performance. Complementing this is the Mental Self-Government Theory, which classifies thinking styles that influence academic success (Sternberg, 1990). Access to essential resources like electricity, study materials, and tools significantly affects students' ability to learn effectively.

The study also integrates the Juran Trilogy, which emphasizes quality planning, control, and improvement in managing quality processes (Juran, 1986). Quality issues in education, like insufficient resources, can be mitigated through systematic quality management practices. Similarly, Rogers' (1962, 2003) Innovation Diffusion Theory explains the adoption of innovations through five stages: knowledge, persuasion, decision, implementation, and confirmation. Key factors such as relative advantage, compatibility, complexity, trialability, and observability influence adoption rates (Straub, 2009).

The study also considers Garvin's (1987) Eight Dimensions of Quality, which assess product or service effectiveness based on performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. The Technology Acceptance Model (TAM) by Davis et al. (1992) suggests that a system's perceived usefulness and ease of use determine its adoption.

Legally, the study is supported by Republic Act 9155, which establishes the governance of basic education, ensuring accessible education for all. Republic Act 10533 strengthens basic education by enhancing curricula and extending the years of training, reinforcing the role of TESDA in vocational education.

By examining these theories and legal frameworks, the study aims to address the challenges in TVL education, ensuring quality training and skill acquisition that align with industry needs and educational policies.

Methodology:

This section presented the method and design used, the flow of the study, the research locale, the research respondents, the research instruments, the data collection procedure, the statistical treatments of data, the scoring procedure, and the definition of terms.

Design

The study used the Quasi-experimental research method to gather facts regarding the details of planning, designing, and fabricating the innovated square bar twister. A time-efficient research method, descriptive survey design engages the people at the center of the research objective.

This research determined the technical requirements of the innovated square bar twister fabrication and the device's extent of acceptability from the sample's perspective through the prepared survey. The data were treated with the appropriate statistical tools to test the research hypothesis.

After the respondents utilized the innovated square bar twister made by the researcher, results were expressed. Two sets of questionnaires have been utilized and administered to the Shielded Metal Arc Welding (SMAW) teachers and

Subangdaku Technical Vocational School of Mandaue City Division students. Data were analyzed and interpreted based on the perception of the respondents.

Environment

This research was conducted at Subangdaku Technical Vocational School of the South District Division of Mandaue City.

Subangdaku Technical Vocational School is one of the 16 secondary schools in Mandaue city. It is located at M. Logarta street, barangay Subangdaku Mandaue city, 6014 which borders Mandaue and Cebu City. The city government owns the school site with a land area of 3,500 square meters.

Subangdaku Technical Vocational School has three (3) elementary schools which serve as feeder schools. Subangdaku Elementary School is almost a kilometer, and Mabolo Elementary School is also 1 kilometer from our school. It is also strategically located at the heart of the Aboitiz land, undergoing the construction of malls, condominiums, and other soon-to-rise commercial buildings.

The school was established in 1997 as Subangdaku National High School and was converted to Subangdaku Technical Vocational School in 2007. It offers Junior High School and Senior High School with TVL tracks such as automotive servicing, Shielded Metal Arc Welding (SMAW), cookery, bread and pastry, food and beverage, hairdressing, dressmaking and tailoring, and general academic strand (GAS), the school has six concrete buildings that are all in good condition 2 of which was donated and built by Aboitiz foundation, the other four were built through the efforts of the local government and a newly built multi-purpose covered court. The school has 44 rooms, of which ten were used as shops for the TVE subjects, one library, one audio-visual room, one clinic and isolation room, one property room, one school canteen, one principal office, one guidance and accounting office. It also has 30 comfort rooms, four hand washing facilities, one grotto, one material and recovery facility, one security guard posting, and a gulayan at the school's corners.

STVS has 42 teaching staff, eight non-teaching staff, and over 893 students catered to both junior and senior high schools.

Respondents

The respondents in the study were the Shielded Metal Arc Welding teachers and students in Subangdaku Technical Vocational School. They were chosen through purposive sampling in data collection and answering the questionnaires administered to them. Table 1 shows the distribution of respondents.

Table 1
Distribution of Respondents

	Respondents from Subangdaku Technical Vocational School	
Teachers	5	9.09%
Students	50	90.91%
Total	55	100%

Instrument

The research utilized the modified standardized questionnaire of Davis (1989) and Mtebe (2014) regarding "Perceived Usefulness, Perceived Ease of use, and User Acceptance" and "Investigating Students' Behavioral Intention to Adopt and Use Mobile Learning In Higher Education." Instruments were adopted in this research and distributed among teachers with some modifications. The questionnaire consists of 3 sections. The first section is about the teacher's profile, where fundamental demographic question such as age and gender, civil status, number of years in teaching, highest educational attainment, appropriate training, seminars, and workshops attended was also included; it was followed by the student's profile such as age and gender. The second section referred to the technical requirements of the innovated square bar twister fabrication. The last section concerns the extent of the acceptability of the device's ease of use of the innovated square bar twister.

Data Gathering Procedure

For data gathering, the first step is to pass an approval letter addressed to the School Principal of Subangdaku Technical Vocational School of Mandaue City Division to seek approval to conduct the study.

After the letter is approved, the questionnaire will be personally distributed to the respondents. The respondents will be given ample time, preferably 15-20 minutes, to answer the questionnaire. If they prefer to answer the questionnaire through their preferred online platforms, questionnaires will be given through it.

Data will be collected and submitted to the statistician for statistical treatment. It is then subjected to further presentation, analysis, and interpretation with the guidance of the research adviser.

Statistical Treatment of Data

The responses of the respondents were statistically treated with the use of several non-parametric metrics:

Simple Percentage. This statistical treatment determined the relevant information taken from the age and gender of the teachers, civil status, number of years in service, highest educational attainment, appropriate training, seminars, and workshops attended.

Weighted Mean. This statistical treatment was used to assess the technical requirements of the fabrication of the innovated square bar twister and the extent of the acceptability of the device's ease of use of the innovated square bar twister.

Spearman's rho correlation coefficient. This statistical treatment determined whether there is a difference between the perception of the respondent groups on the acceptability of the innovated square bar twister.

Standard Deviation. This will determine how dispersed the data is in relation to the mean validation of using the Innovated Square Bar Twister and its performance.

Scoring Procedures

The participants were required to use a Likert scale to determine the technical requirements of the fabrication of the innovated square bar twister and the acceptability of the design. They rated each item on a 4-point Likert scale.

Weight	Range	Category	Verbal Description
4	3.26 – 4.00	Highly Acceptable	If the device function very well on its purpose all the time
3	2.51 – 3.25	Acceptable	If the device function very well on its purpose frequently.
2	1.76 – 2.51	Less Acceptable	If the device function well on its purpose on an occasional basis.
1	1.00 – 1.75	Not Acceptable	If the device does not function

Results and Discussion:

Design Features

Design features play a crucial role in model prediction by determining the usefulness of specific variables in a given system. A thorough understanding of material characteristics enables designers to optimize material selection for specific applications, addressing limitations and constraints within a design framework. In this study, the technical requirements of the Innovated Square Bar Twister for Shielded Metal Arc Welding were assessed based on various design features, as rated by both teachers and students. Table 1 presents the findings.

Table 2. Design Features

Design Features	Standard (Teachers)	Deviation	Standard (Students)	Deviation	Average Weighted Mean	Verbal Description
Accessibility of the device	0		0.46		3.85	Highly Acceptable
Availability of the device	0		0.60		3.86	Highly Acceptable
Reliability of the device	0.40		0.66		3.70	Highly Acceptable
Interoperability of the device	0		0.78		3.72	Highly Acceptable
Serviceability of the device	0.48		0.65		3.64	Highly Acceptable
Performance of the device	0		0.65		3.85	Highly Acceptable

Productivity of the device	0.38	3.91	Highly Acceptable
Average		3.79	Highly Acceptable

The results indicate that the device was rated as "Highly Acceptable" across all design feature indicators. Among teachers, the highest-rated features were **Accessibility, Availability, Interoperability, Performance, and Productivity**, each receiving a mean score of 4.00. Students also rated **Productivity** as the highest (M=3.91), highlighting its efficiency in fulfilling its intended purpose.

As emphasized by Nihon (2020), accessibility is a fundamental principle of design, ensuring that products and services are usable by all individuals regardless of circumstances. Effective design also fosters interoperability, enabling different systems and devices to function cohesively without additional effort from the end user. This is particularly beneficial in educational settings where seamless integration of equipment enhances learning outcomes.

The lowest-rated design feature among both teacher and student respondents was **Serviceability** (M=3.60 for teachers; M=3.64 for students), though still classified as "Highly Acceptable." Serviceability refers to the ease of maintaining, repairing, and upgrading a system. According to Honfi (2019), effective serviceability design accounts for environmental exposures, structural response, and long-term performance criteria. The findings suggest that while the device meets expectations, improvements in ease of maintenance could further enhance its usability in metalwork applications.

The **average weighted mean of 3.79** signifies that the **Innovated Square Bar Twister meets the technical requirements for metalwork applications**, aligning with industry standards for reliability, performance, and accessibility.

Functions

Functions play a vital role in reducing effort and enabling users to perform tasks more efficiently. Understanding standard device functions is crucial in identifying how technological tools improve productivity and ease of operation. Table 2 presents the extent to which the Innovated Square Bar Twister fulfills its functional requirements.

Table 2. Functions

Functions	Standard (Teachers)	Deviation	Standard (Students)	Deviation	Average Mean	Weighted Verbal Description
Easy to produce twisted square bar	0.40		0.37		3.82	Highly Acceptable
Increase the speed in twisting	0.49		0.38		3.71	Highly Acceptable
Lighten the work in twisting	0.40		0.40		3.80	Highly Acceptable
Set up the workpiece easily	0.49		0.80		3.50	Highly Acceptable
Average					3.71	Highly Acceptable

Both teacher and student respondents rated the device's functions as **Highly Acceptable**, with the highest ratings given to **"Easy to produce twisted square bar" and "Lighten the work in twisting."** This highlights the device's ability to facilitate efficient metal twisting operations with minimal effort.

The lowest-rated function was **"Set up the workpiece easily"** (M=3.60 for teachers; M=3.40 for students). This suggests that some users may face difficulties during the initial setup process, possibly due to unfamiliarity with the device. However, as users gain experience, the setup process is expected to become more intuitive.

The **average weighted mean of 3.71** confirms that the **device effectively meets functional requirements, improving efficiency and ease of operation in metalwork applications.**

Ergonomics

Ergonomics is a critical consideration in device design, ensuring user comfort, safety, and efficiency. Table 3 presents the respondents' evaluation of the Innovated Square Bar Twister's ergonomic attributes.

Table 3. Ergonomics

Ergonomics	Standard (Teachers)	Deviation Standard (Students)	Average Mean	Weighted Verbal Description
Safety in using the Device	0.40	0.61	3.68	Highly Acceptable
Comfortability of the Device	0.49	0.60	3.59	Highly Acceptable
Rigidity of the Device	0.75	0.64	3.37	Highly Acceptable
Durability of the Device	0.49	0.66	3.50	Highly Acceptable
Average			3.54	Highly Acceptable

The highest-rated ergonomic feature was **"Safety in using the device"** (M=3.80 for teachers; M=3.68 for students), highlighting the importance of workplace safety in metalwork applications. Proper ergonomic design minimizes the risk of workplace injuries, contributing to increased efficiency and productivity (Nihon, 2020).

The lowest-rated feature among teachers was **"Rigidity of the device"** (M=3.20), while students gave the lowest rating to **"Durability of the device"** (M=3.40). Although these aspects were still considered "Highly Acceptable," improvements in material selection and construction may enhance the device's longevity and structural integrity.

The **average weighted mean of 3.54** affirms that **the device meets ergonomic requirements, ensuring user comfort, safety, and efficiency.**

Safety

Safety is paramount in any workplace setting, particularly in metalworking environments where risks are inherent. Table 4 presents the evaluation of the Innovated Square Bar Twister in terms of safety.

Table 4. Safety

Safety	Standard (Teachers)	Deviation Standard (Students)	Average Mean	Weighted Verbal Description
Safety habits are being applied	0	0.47	3.84	Highly Acceptable
Preparation of tools and materials	0	0.49	3.80	Highly Acceptable
Adequate ventilation of the working area	0.49	0.63	3.50	Highly Acceptable
Average			3.68	Highly Acceptable

With an **average weighted mean of 3.68**, the findings affirm that **the device upholds workplace safety standards, ensuring proper handling, ventilation, and preparation procedures.**

**Table 5
Usefulness**

Usefulness	Standard Deviation		Average Weighted Mean	Verbal Description
	Teachers	Students		
My job would be difficult to perform without innovated square bar twister	0	0.47	3.83	Highly Acceptable
Using innovated square bar twister gives me greater control over my work	0.75	0.78	3.24	Highly Acceptable
Using innovated square bar twister improves my job performance	0.49	0.69	3.48	Highly Acceptable

Using innovated square bar twister saves me time	0	0.81	3.74	Highly Acceptable
Average			3.57	Highly Acceptable

Likely it will be used. The most important of these three concepts, however, is used. It makes no difference how excellent and usable a design is if it is not used. Designers will likely investigate how to transition from helpful to proper for their work to be valuable. Table 15 presents the extent of the acceptability of the device ease of use of the Innovated Square Bar Twister for Shielded Metal Arc Welding in terms of Usefulness as rated by teachers and students.

As presented in Table 5, Two of the indicators of the teacher's respondents had the highest weighted mean, "My job would be difficult to perform without innovated square bar twister and Using innovated square bar twister saves me time" with a weighted mean of **4.00**, interpreted as **Highly Acceptable**. The student respondents' highest weighted mean was "My job would be difficult to perform without innovated square bar twister," with a weighted mean of **3.66**, interpreted as **Highly Acceptable**. This implies that the device always functions very well for its purpose.

With the use of innovated square bars, users perform their job smoothly by twisting the square bar. They do not need to align their raw materials once it has been set up in the device. It will automatically produce an aligned workpiece itself. With this device's help, the user can perform the job accurately. They will turn without exerting too much force to operate the device. Also, it will help users to have their job precise and free from back jobs.

On the other hand, the indicator with the lowest weighted mean for teachers-respondent was "Using innovated square bar twister gives me greater control over my work," with a weighted mean of **3.20**, interpreted as **Acceptable**. From the student respondents, the lowest weighted mean was "Using innovated square bar twister gives me greater control over my work," with a weighted mean of **3.28**, interpreted as **Highly Acceptable**. Although this got the lowest score, it was still manifested by respondents most of the time.

When faced with an exciting challenge, one of the most rewarding feelings is the sense of being able to control our efforts to create an outcome. This feeling of control is known as self-efficacy. It is having an awareness of your skills and confidence that you can use them to face any challenges in your day-to-day life. It is a good feeling and one that we might not even notice. The perception of your actions has an impact on success. Being aware of our ability to control what we do in our work and our relationship with our work impacts our success as employees.

The average weighted mean for teachers and students respondents was **3.57**, interpreted as Highly Acceptable. This means that the Extent of the Acceptability of the Device Ease of Use of the Innovated Square Bar Twister for Shielded Metal Arc Welding in terms of Usefulness met the Acceptability of the Device Ease of Use for the device that could reflect the usefulness of the Metalwork shops.

Ease of Use

Outstanding ease of use significantly reduces the resources required to operate a device. When users can effortlessly navigate a product, service, or application, the need for repair services diminishes. This not only saves time and effort but also enhances overall productivity and output quality.

User support is a key factor in ease of use. It is essential to ensure that users can easily find answers to their questions. Providing accessible tutorials and clear instructions can enhance user experience, even when issues arise. The simpler the product, service, or device is to use, the broader its reach will be. If a product is intuitive and well-supported, it is more likely to attract and retain a diverse user base.

Table 6 presents the extent of acceptability of the ease of use of the Innovated Square Bar Twister for Shielded Metal Arc Welding, as rated by both teachers and students.

Table 6: Ease of Use

Ease of Use Indicators	Standard Deviation (Teachers)	Standard Deviation (Students)	Average Weighted Mean	Verbal Description
I often become confused when using the Innovated Square Bar Twister	0.40	0.54	1.55	Not Acceptable
I make errors frequently when using the Innovated Square Bar Twister	0.40	0.50	1.38	Not Acceptable

I need to consult the user manual often when using the Innovated Square Bar Twister	0.75	0.38	1.49	Not Acceptable
I find it easy to recover from errors encountered while using the Innovated Square Bar Twister	0.40	0.56	3.38	Highly Acceptable
I find it easy to get the Innovated Square Bar Twister to do what I want	0.49	0.70	3.35	Highly Acceptable
It is easy for me to remember how to perform tasks using the Innovated Square Bar Twister	0.40	0.75	3.50	Highly Acceptable
I find the Innovated Square Bar Twister easy to use	0.00	0.64	3.75	Highly Acceptable
Average			2.63	Acceptable

As shown in Table 6, the highest-rated statement for both teachers and students was "I find the Innovated Square Bar Twister easy to use," with a weighted mean of 4.00 for teachers and 3.50 for students, both interpreted as Highly Acceptable. This indicates that the device effectively serves its intended purpose.

A key strategy for ensuring ease of use is testing the device with individuals unfamiliar with it. By gathering feedback from new users, including teachers and students, usability can be enhanced, making the device more accessible to a wider audience. Ensuring an intuitive design fosters user satisfaction and long-term engagement.

Conversely, the lowest-rated statements were "I often become confused when using the Innovated Square Bar Twister" and "I make errors frequently when using the Innovated Square Bar Twister," with weighted means of 1.20 for teachers and 1.18 for students, both categorized as Not Acceptable. Although these aspects received the lowest ratings, they still indicate occasional challenges experienced by some users.

If users struggle to understand a device, they may experience confusion, difficulty concentrating, or trouble remembering operational procedures. Users often rely on guidance from teachers or experts to clarify uncertainties. Initial unfamiliarity or preconceived expectations may contribute to confusion, highlighting the importance of user training and support materials.

The overall average weighted mean for teachers and students was 2.63, interpreted as Acceptable. This suggests that the ease of use of the Innovated Square Bar Twister meets the standard acceptability criteria for metalwork applications.

Behavioral Intention to Use

According to the Technology Acceptance Model (TAM), two key factors influencing user acceptance of technology are perceived usefulness and ease of use (Davis, 1989). Perceived usefulness influences ease of use but not vice versa. Both factors shape behavioral intentions, which, in turn, predict actual technology adoption.

Table 7 presents the extent of the acceptability of the Innovated Square Bar Twister in terms of behavioral intention to use, as rated by teachers and students.

Table 7: Behavioral Intention to Use

Behavioral Intention Indicators	Standard Deviation (Teachers)	Standard Deviation (Students)	Average Weighted Mean	Verbal Description
I would find the Innovated Square Bar Twister useful in my learning	0.00	0.75	3.69	Highly Acceptable
Using the Innovated Square Bar Twister will enable me to accomplish learning activities more quickly	0.00	0.57	3.72	Highly Acceptable
It would be easy for me to become skillful in using the Innovated Square Bar Twister	0.75	0.70	2.93	Acceptable
I intend to use the Innovated Square Bar Twister applications in the future	0.49	0.83	3.35	Highly Acceptable
Average			3.42	Highly Acceptable

As indicated in Table 7, the highest-rated indicator for both teachers and students was "Using the Innovated Square Bar Twister will enable me to accomplish learning activities more quickly," with weighted means of 4.00 and 3.44, respectively, both interpreted as Highly Acceptable. This highlights the device's efficiency in enhancing learning experiences.

Conversely, the lowest-rated indicator was "It would be easy for me to become skillful in using the Innovated Square Bar Twister," with weighted means of 2.80 for teachers and 3.06 for students, both interpreted as Acceptable. Although it received the lowest rating, it still indicates that most users can develop proficiency over time.

Time management and practical application are crucial for skill acquisition. Learning occurs most effectively through hands-on experience, reinforcing knowledge retention and competency. Users are encouraged to practice consistently and seek guidance to enhance their skills.

The weighted mean for teachers and students was 3.42, interpreted as Highly Acceptable. This suggests that the Innovated Square Bar Twister is well-received in terms of behavioral intention to use, indicating strong potential for continued adoption in metalwork applications.

Actual System Use

Actual system use refers to how individuals engage with a technology after adopting it. Behavioral intention influences actual use, ensuring that users operate the device efficiently and reliably.

Table 8 presents the extent of acceptability of the Innovated Square Bar Twister in terms of actual system use, as rated by teachers and students.

Table 8: Actual System Use

Actual System Use Indicators	Standard Deviation (Teachers)	Standard Deviation (Students)	Average Weighted Mean	Verbal Description
The process of using the Innovated Square Bar Twister is convenient and user-friendly	0.40	0.67	3.67	Highly Acceptable
The nature of the Innovated Square Bar Twister creates an environment that provides workspaces	0.80	0.70	3.25	Acceptable
With full access to the Innovated Square Bar Twister, learning fabrication techniques is always possible	0.49	0.69	3.26	Highly Acceptable
Significant time is saved due to the availability of the Innovated Square Bar Twister in the SMAW shop	0.80	0.68	3.47	Highly Acceptable
Average			3.41	Highly Acceptable

The findings indicate that the Innovated Square Bar Twister is highly acceptable in terms of ease of use, behavioral intention, and actual system use, supporting its practical application in metalwork education.

Conclusion:

Based on the findings and after careful analysis and interpretation of the study, it is concluded that the Innovated Square Bar Twister for Shielded Metal Arc Welding meets the standards and is precisely functional in performing each function for Metalworks Instructions and laboratories. The testing of the relationship between the respondent's perception and the acceptability and effectiveness of the innovated square bar twister has an impact on the respondents' perception.

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