

ASSESSMENT AND VALIDATION OF FACILITIES FOR IMPLEMENTING EMPLOYABILITY SKILLS MODULE IN ALUMINIUM FABRICATION: A STUDY IN NIGERIAN TECHNICAL COLLEGES

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ABSTRACT

Technical and Vocational Education and Training (TVET) programs rely on well-equipped facilities to effectively impart skill-based education. This study focuses on identifying and validating the necessary facilities for implementing an employability skills module in aluminium fabrication within Nigerian technical colleges. The research encompasses a population of 1181 individuals, including technical teachers, technologists, and industrial-based supervisors. Employing a multi-stage sampling procedure, a sample size of 318 participants was selected. Data was collected using the Implementing Employability Skills Module Questionnaire (IESMQ), validated by experts and assessed for reliability using Cronbach's alpha ($\alpha = 0.92$). Additionally, constructs were examined through Average Variance Extracted (AVE) and Composite Reliability (CR) values of 0.54 and 0.89, respectively. Confirmatory Factor Analysis (CFA) was employed to validate the appropriateness of identified facilities for implementing the employability skills module in aluminium fabrication. The results demonstrate that conditions for convergent, construct, and discriminant validity were duly fulfilled. Based on these findings, it is recommended that the identified facilities receive prioritization and procurement to ensure the successful implementation of the employability skills module in aluminium fabrication and glazing work within the context of Nigerian technical colleges.

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1. INTRODUCTION

Employability skills without any doubt remain a fundamental component of Technical and Vocational Education and Training (TVET) systems in the world over. These skills are all encompassing with a wide retinue of attributes including but not limited to communication, teamwork, problem-solving, and technical proficiency, that are essential for individuals to secure and maintain employment. In Nigeria, technical colleges are key institutions responsible for imparting skills, contributing to the nation's economic growth and addressing the skills gap in various industries (Souviron, 2019).

Technical colleges are TVET institutions where recipients are exposed to skill-based programmes targeted towards acquiring relevant knowledge and skills in different trades for self-reliance, and employment in the world of work (Olakotan, 2022). Technical colleges as training institutions enable students to acquire relevant and adequate knowledge, skills and attitude for employment in various occupations under the tutelage of qualified teachers (Nwachukwu, Bakare & Jika, 2011). Technical colleges are part of the Nigerian TVET institutions under the supervision of the National Board for Technical Education (NBTE). The NBTE ensured that all academic programmes across the technical colleges enjoy periodic accreditation and curriculum development.

The National Business and Technical Examinations Board (NABTEB) is responsible for the examination and certification of the occupational trades offered by the technical colleges. Hence, Bobrytska (2020) stated that quality in the TVET sector is maintained through a process of curriculum development, accreditation of programmes and enforcement of carrying capacities of institutions for accredited programmes. This is undertaken through curriculum development, review and inspection visits by teams representing the major stakeholders in the specialized areas including representatives of professional registration councils, employers of labour, academic staff from universities and professional peers from the polytechnics.

In addition, Technical colleges are TVET institutions in Nigeria saddled with the responsibility of equipping recipients with employability skills (FGN, 2013). However, the technical colleges that are mandated to produce skilled craftsmen in different occupations do not accommodate Aluminium Fabrication (AF) as observed by the researchers, despite the opportunities that could be derived from it. Aluminium fabrication is a significant sector in Nigeria, with applications in construction, manufacturing, and infrastructure. However, the demand for skilled aluminium fabricators is continually rising. To meet this demand, it is essential that technical colleges offer appropriate training programs that align with industry standards and equip students with the requisite employability skills.

Aluminium fabrication offers great opportunities for trainees due to widely acceptance of the use of aluminium and glass for doors, windows, arcs, shelves and wardrobes in both private and commercial buildings. It has also been carefully observed that modern houses are now adorned with aluminium and glass products due to its uniqueness and aesthetic value. Aluminum receives a wide acceptance in the world over as its usage spans through different areas of human endeavour such as school, private and commercial buildings, and in all manner of buildings around the globe (Muhammed, 2010). The use of aluminum in business and office complexes, buildings, theatres, auditorium is very extensive for functional as well as decorative purposes. Similarly, in residential buildings, aluminium doors, windows, railings, grill works are used extensively. Textile shops and other trading shops in lighter materials too are equipped with shelves made of aluminum for stacking purposes.

Aluminum has many properties such as light in weight, strength, resistance to corrosion, durability, easy fabrication, attractive appearance and easy maintenance that make it a popular material for use in modern buildings (Muhammed, 2010). Aluminium fabricated

and anodized items like doors, windows, railings, staircases, shelves and ladders among others are being increasingly used in the modern constructions on considerations of durability and appearance. In the present time, theatres, restaurants, hotels, shopping complexes, office premises and other luxurious buildings are fast replacing wooden materials with aluminium-fabricated items. The consumption of aluminium in construction generally is on the increase. In spite of the opportunities provided in AF, personal observations shows that it has not been identified and incorporated for training purposes to enhance technical college graduates employability skills. Aluminium fabrication is a specialized field that requires both technical skills and employability skills. Technical skills in aluminium fabrication involve knowledge of materials, equipment, and various welding and cutting techniques. Employability skills in this context include teamwork for collaborative projects, effective communication with clients and team members, problem-solving when encountering challenges in the fabrication process, and adaptability to changing customer requirements and technologies (Cook, 2013).

Employability skills refer to technical and non-technical skills required by an individual to enter and make progress and function effectively in the world of work. Employability skills according to Rowe and Zegwaard (2017) refer to work-readiness skills necessary for acquiring and retaining a job in a competitive environment. Employability skills are as important as technical skills in today's workforce, as they enhance an individual's ability to perform well in the workplace and adapt to changing circumstances (Dehmel, 2016). In the views of Muhammad, Soetyono and Sunardi (2017), employability skills are person's ability to actively adjust in a particular job for easy survival and realization of success at work. Skills refer to overt qualities demonstrated in technical and practical abilities to solve cogent problems which are of benefits to self and the society at large (Oke & Olakotan, 2017).

Facilities are objects and materials used for teaching effectively in TVET institutions. Oke and Olakotan (2018) asserted that facilities are the pivot on which skill acquisition hinges upon in all TVET institutions. Additionally, Yaro (2018) stated that adequate training facilities enhance skill development of students in technical occupation. Facilities for implementing Aluminium Fabrication and Glazing Work modules include: equipment, tools and consumables some of which are: measuring tape, bench vice, steel rule, vernier caliper, hacksaw, try-square, center punch, scribe, screwdriver, hand drill, jig saw, aluminium cutting machine, off cut machine, rivet gun, tap and dies, Aluminium Sections (All size and shape), hacksaw blades, screws, rivets, drill sets, and rubber among others. Lemo and Olakotan (2016) noted that facilities constitute a very important resource in the attainment of educational objectives and that its availability, adequacy and utilization enhance skill acquisition. Also, Yisa and Olakotan (2017) averred that training learners with relevant facilities help in acquiring skills to carry out given tasks. In a similar vein, TVET programs place a strong emphasis on practical, hands-on learning experiences. Therefore, having appropriate facilities and resources is essential for students to develop the technical and practical skills required for their chosen careers (Grubb, 2013). Well-equipped workshops, laboratories, and classrooms facilitate the acquisition of these skills and provide a platform for learners to apply theory to real-world situations. Also, adequate facilities and resources are integral to maintaining the quality of education and training in TVET. They contribute to better teaching and learning experiences, which are essential for quality assurance in educational programs (Støren et al., 2010). The crucial question is about what are the facilities that will be appropriate to implement employability skills module in aluminium fabrication in Nigerian technical colleges. It must be noted that Nigerian technical colleges often face challenges in keeping their curricula and facilities up-to-date with the dynamic needs of industries. The effectiveness of TVET relies on a close connection between what

students are taught and what employers expect. This was why Omole (2017) noted that persistent challenges bedeviling TVET programmes in Nigeria include: inadequate infrastructure, outdated curricula, and a mismatch between skills taught and industry demands.

Facilities constitute a major resource for the implementation of any meaningful programme in TVET, Aluminium Fabrication inclusive. This study ascertained facilities for implementing employability skills module in aluminium fabrication and glazing work for Technical Colleges. However, if relevant facilities are not identified, and procured as appropriate, the implementation of the any skill-based programme will be marred and the expected skills to be possessed by recipients of such programmes will be hampered. Thereby, giving room for unemployment and idleness among youths of workable age in Nigeria. Therefore, it becomes imperative to ensure that necessary facilities and resources to deliver a relevant employability skills module for aluminium fabrication are put in place. Addressing this problem is crucial to bridge the gap between classroom education and the demands of the job market.

2. METHODOLOGY

This study adopted a descriptive research design of the survey type which involved the use of questionnaire to elicit information from the respondents. The design was considered suitable for the study since it sought the opinions of technical teachers, technologists and industrial-based supervisors and no variable was manipulated. The population for the study was 1181 which comprise 147 technical teachers (Mechanical biased), 116 technologists and 918 industrial-based supervisors. The sample size for this study was 318 using multistage sampling procedure. Stage one involved the selection of 132 respondents comprising 22 technical teachers each from Ekiti, Lagos, Ogun, Ondo, Osun and Oyo States using proportionate sampling technique. Stage two involved the selection of 96 respondents comprising of 16 technologists each from Ekiti, Lagos, Ogun, Ondo, Osun and Oyo States using simple random sampling technique. Stage three involved the selection of 90 respondents comprising 15 industrial-based supervisors each from Ekiti, Lagos, Ogun, Ondo, Osun and Oyo States using purposive sampling technique. Purposive sampling technique was adopted because this sample had the desired criteria and therefore the researcher exercises judgment on the representative sample as to suit the research purpose.

A self-developed instrument entitled "Implementing Employability Skills Module Questionnaire (IESMQ) was used for the study. The IESMQ was based on an adapted Likert Scale rating of: Highly Required (HR) – 5, Required (R) – 4, Undecided (U) – 3, Not Required (NR) - 2, Highly Not Required (HNR) -1. The face and content validation of the instrument was ascertained by five experts, while the reliability of the instrument was ensured using Cronbach Alpha and a coefficient of 0.92 was obtained. The instrument was administered on the respondents with the help of six research assistants in which out of the 132 copies distributed to technical teachers, 103 copies were retrieved, 79 copies were also retrieved from technologists out of 96 copies earlier distributed, while 85 copies were retrieved from industrial-based supervisors from the 90 copies earlier distributed. In all, 267 copies were duly returned representing 83.9% return rate.

The data generated was analyzed using descriptive and inferential statistics. The descriptive statistics of mean and standard deviation were used to answer the research question raised. Furthermore, as soon as the descriptive analysis was achieved, the normality of the data for each construct was ensured before embarking on Confirmatory Factor Analysis (CFA). The CFA was done using Analysis of Moment Structures (AMOS) software. A mean of 3.50 was used as the cut-off point for decision rule for each item. Based on this

value, any item with a mean of 3.50 and above was considered as appropriate, while any item with a mean below 3.50 was considered as in appropriate. Therefore, for every fitted model, all the factor loadings must be equal to or above 0.5. Also, the modification indices such as CFI, IFI, TLI must be above 0.90; the ratio of the Chi-square and the Degree of freedom (df) < 3 and $RMSEA < 0.08$. Hence, the revised models were performed wherever the initial CFA models did not meet up with the stated criteria.

3. RESULTS

To answer the research question, mean and Confirmatory Factor Analysis were used. The result of the computation is as presented in Table 1 as well as Figures 1 and 2.

Table 1. Appropriate Facilities for Implementing Employability Skills Module in Aluminium Fabrication

S/N	Appropriate Facilities for Implementing Employability Skills Modules in AF are:	\bar{X}	S.D	Remarks
1	Basic hand tools	4.36	.91	Required
2	Basic power tools	4.40	.84	Required
3	Basic equipment	4.37	.89	Required
4	Personal protective equipment	4.27	.97	Required
5	Miscellaneous tools	4.29	.95	Required
6	Advanced machines	4.36	.86	Required
7	Basic machines	4.27	.97	Required
8	Consumables and accessories	4.32	.93	Required
9	Teaching and learning facilities	4.42	.92	Required

The data presented in Table 1 revealed 9 appropriate facilities for implementing the Employability Skills Module in Aluminium Fabrication. The Mean for the facilities ranged from 3.87 to 4.97. Each Mean is above the cut-off of 3.50 showing that all were required for implementing Employability Skills Module in Aluminium Fabrication. The standard deviation of the facilities also ranged from .84 to .97. This indicated that the respondents were close to one another in their opinions and that they were not far from the mean.

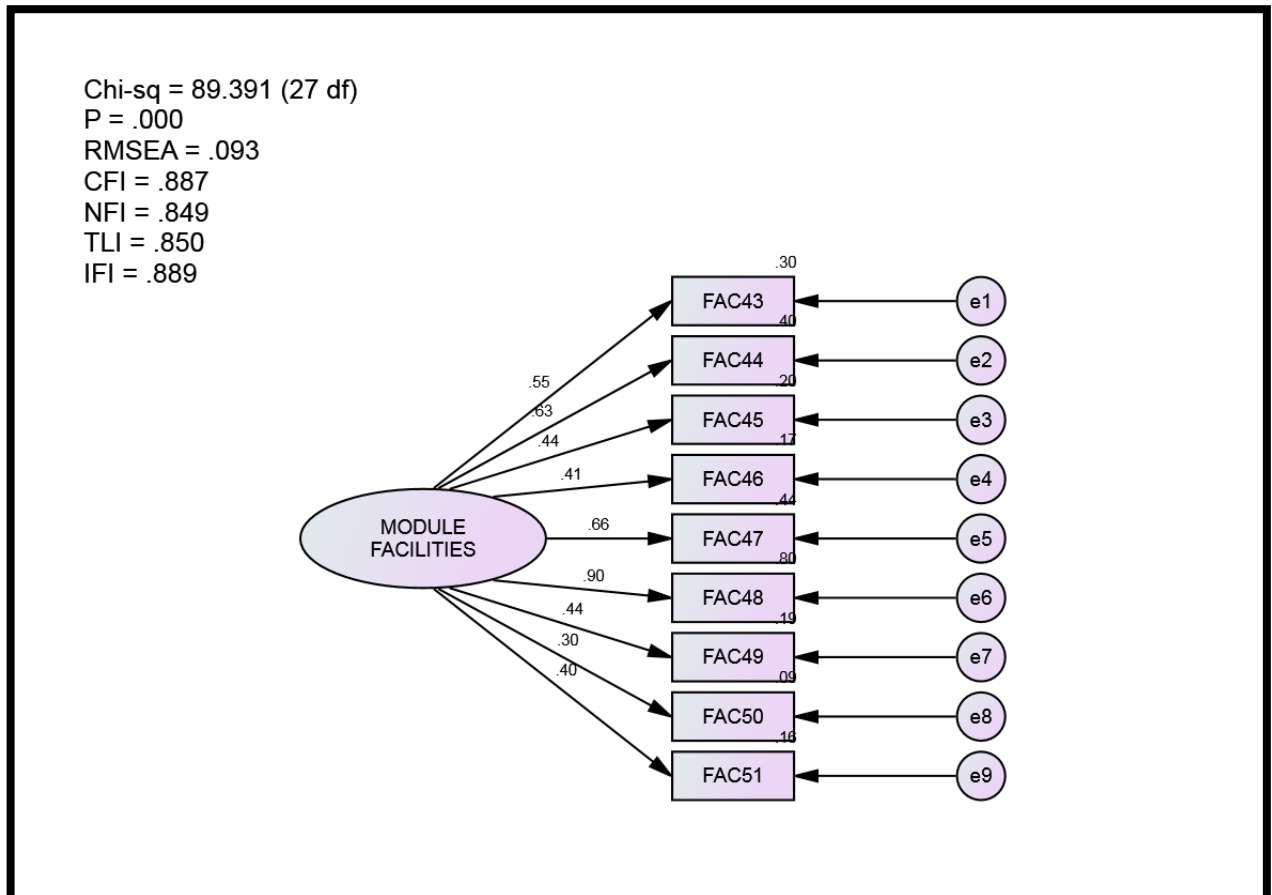


Figure 1: Initial Model for Appropriate Facilities for Implementing Employability Skills Module in Aluminium Fabrication

The initial model based on Confirmatory Factor Analysis (CFA) on appropriate Facilities for Implementing Employability Skills Module in Aluminium Fabrication was not found fitted and did not comply with a goodness model fit. The Chi-square = 89.391, $df = 27$, $P = .000$, the ratio of the Chi-square and the $df (> 3) = 3.31$, $NFI = .849 (< .90)$, $CFI = .887 (< .90)$, $IFI = .889 (< .90)$, $TLI = .850 (< .90)$ and $RMSEA = .093 (> .080)$. Hence, in order to fulfill the requirements, the model was trimmed sequentially so that the items remaining will fit well to the data at $P > 0.05$ while the modification indices (NFI , CFI , IFI , TLI) and $RMSEA$ measured up to the standard.

Chi-sq = 17.653 (15 df)
 P = .281
 RMSEA = .026
 CFI = .988
 NFI = .928
 TLI = .983
 IFI = .988

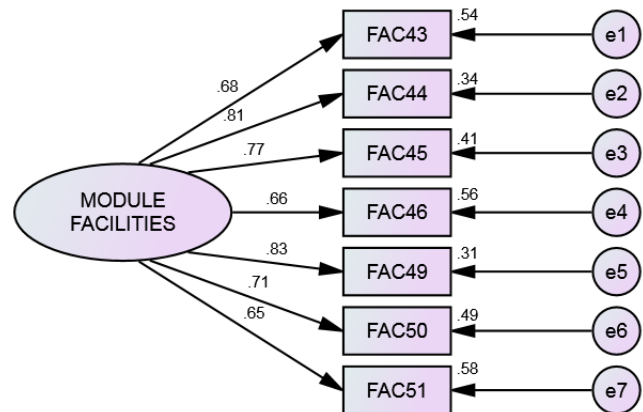


Figure 2: Revised Model on Appropriate Facilities for Implementing the Employability Skills Module in Aluminium Fabrication

The revised model developed on appropriate Facilities for Implementing the Employability Skills Module in Aluminium Fabrication had seven items with factor loadings ranging from .65 to .83. The Chi-square = 17.653, $df = 15$, $P = .281$, the ratio of the Chi-square and the df (< 3) = 1.17, $NFI = .928$ ($> .90$), $CFI = .988$ ($> .90$), $IFI = .988$ ($> .90$), $TLI = .983$ ($> .90$) and $RMSEA = .026$ ($< .080$).

Table 2. Factor Loadings for Appropriate Facilities for Implementing Employability Skills Module in Aluminium Fabrication

CODE	Item Statements	Initial Model		Revised Model		Validity/ Reliability	
		Factor Loading	Error Variance	Factor Loading	Error Variance	CR	AVE
	Facilities					0.89	0.54
FAC1	Basic hand tools	.55	.30	.68	.53		
FAC 2	Basic power tools	.63	.40	.81	.34		
FAC 3	Basic equipment	.44	.20	.77	.41		
FAC 4	Personal protective equipment	.41	.17	.66	.56		
FAC 5	Miscellaneous tools	.66	.44	Deleted			
FAC 6	Advanced machines	.90	.80	Deleted			
FAC 7	Basic machines	.44	.19	.83	.31		
FAC 8	Consumables and accessories	.30	.09	.71	.49		
FAC 9	Teaching and learning facilities	.40	.16	.65	.58		

The initial factor loadings of the appropriate facilities for implementing the Employability Skills Module in Aluminium Fabrication had initial factor loadings of 9 items ranging from .30 to .66. While the revised factor loadings had six items with factor loadings ranging from .65 to .83. Each factor loading is above the cut-off of 0.5 showing that all were required for the implementing Employability Skills Module in Aluminium Fabrication. The Composite Reliability (CR) of the appropriate facilities for implementing the Employability Skills Module in Aluminium Fabrication is 0.89, while the Average Variance Extracted (AVE) is 0.54

4. Discussion

The findings of the study on appropriate facilities revealed that seven facilities are adjudged necessary for implementing Employability Skills Module in Aluminium Fabrication. The findings on the facilities for implementing the Employability Skills Module in Aluminium Fabrication are in agreement with the submissions of Yaro (2018) who stated that adequate training facilities enhance skill development of students in technical occupation. Similarly, the submissions of Lemo and Olakotan (2016) also buttressed the findings of this study as the duo noted that using facilities during teaching and learning would equip the students with adequate psychomotor skills and as a result improve their interest level, stimulate their interest to participate in the teaching and learning activities, help them to picture reality in what has been taught and create an interactive learning environment thereby promoting effective teaching and learning.

In a similar manner the positions of Yisa and Olakotan (2017) in relation to the findings of this study was that training learners with relevant facilities help in acquiring skills to carry out given tasks. Therefore, the adjudged necessary facilities for implementing the Employability Skills Module in Aluminium Fabrication and Glazing Work include: basic hand tools; basic power tools; basic equipment; personal protective equipment; basic

machines; consumables and accessories and teaching and learning facilities. Also, the position of Grubb (2013) in relation to the findings of this study was that having appropriate facilities and resources is essential for students to develop the technical and practical skills required for their chosen careers due to the fact that well-equipped workshops, laboratories, and classrooms facilitate the acquisition of these skills and provide a platform for learners to apply theory to real-world situations. While the position of Byun et al. (2018) revealed that adequate facilities and resources are integral to maintaining the quality of education and training in TVET as facilities contribute to better teaching and learning experiences, which are essential for quality assurance in educational programs.

5. CONCLUSION

The need to identify appropriate facilities for implementing employability skills module in aluminium fabrication necessitated this study. This is to ensure that implementers of employability skills module in aluminium fabrication procure and utilize appropriate facilities for effective skill acquisition in aluminium fabrication. Therefore, there is need for relevant stakeholders to ensure that the identified facilities be given priority and procured for the successful implementation of the employability skills module in aluminium fabrication.

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