

Competency-Based Education & Training (CBET), A Practical Strategy For Sustainable Self Employment of Building Technologist

¹Kalu, U Okey, ²Kalu Sunday U, ³Udeala, Richard C, & ⁴Ezeama, Anthony.O.

¹ Civil Engineering Department, University of Nigeria, Nsukka Enugu state, Nigeria.

²Department of Industrial Physics, AE-Federal University, Ikwo, Ebonyi State

³ Civil Engineering Technology Department, Federal Polytechnic, Ukana. Akwa-ibom state, Nigeria.

⁴Department of Mechatronics Engineering, University of Nigeria, Nsukka, Enugu State, Nigeria

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ABSTRACT: *The study determined competency based educational training as a practical strategy for sustainable self-development of building engineering technologists in Enugu state. Two research questions were answered and two hypotheses were tested at 0.05 level of significance. Descriptive survey design was adopted for the study. The population for the study was 115 practicing building engineering technologists. Instrument for data collection was a structured questionnaire. Two experts validated the instrument for data collection. The internal consistency of the instrument items was determined by the use of Cronbach alpha reliability method and 0.84 reliability coefficient was obtained. The data generated were analyzed using mean to answer research questions while t-test was used to test the hypotheses. Findings revealed that competency based educational training have the potentials to foster self-employment of building engineering technologists. It fosters self-employment of building engineering graduates by equipping them with industrial based competencies such as in-depth knowledge of construction practice, building drawing and interpretation skills, building performance analysis skills and determination of building materials behaviours among others. It was recommended that effective partnership between universities and other higher institutions and relevant industries should be encouraged, as this would provide an environment for students to interact with experts such that, relevant contents that meets labour needs would be transmitted to participating students.*

KEYWORDS: competency-based educational training, building engineering technologist self-employment, sustainable, and practical strategy

INTRODUCTION

Competency based educational training (CBET) is an approach to education and skill development being projected by researchers to enhance hands on-practical learning. It focuses on the demonstration and acquisition of specific and generic skills and competencies required for a particular job or vocation. Unlike the traditional methods of training skilled workforce which relied heavily on theoretical knowledge, competency-based educational training emphasizes the power of practical skills and its application in real-world context (Makhatini, 2018). Competency-based educational training is gaining ground speedily in the training of technologists in the fields of vocational and technical education, engineering, development of professional programmes and workforce training initiatives in the western clime.

Competency-based educational training was defined by Billet (2015) as an approach to learning and skill development that focuses on the mastery of specific skills or competencies rather than the completion of predetermined curriculum or the accumulation of credits or grades. CBET is designed to ensure that learners acquire the necessary knowledge, skills and abilities to perform specific tasks or duties effectively. In this type of training programme, the concern of the curriculum developers is on demonstrating proficiency in predetermined competencies or learning outcomes (Govender & Wait, 2018). These competencies are typically defined based on industry needs and standards of operation, job requirements or specific learning outcomes. Learners progress through the programme by successfully completing assessments that evaluate their mastery of each competency.

Competency based educational training is adjudged to be gaining fast ground in training institutions because of its ability to improve the prospects of its learners in several ways including; **Mastery orientation:** It provides learners with opportunity to demonstrate mastery of each competency before advancing to the next level or stage.

Personalizes learning: Learners exposed to this type of teaching method progress at their own pace and can focus on areas where they need improvement

Flexible learning pathways: learners are provided with multiple pathways to achieve mastery of competency. It allows learners to choose their learning methods and resources at will

Real-world application: competencies are often designed to be applicable in real-life situations, preparing learners for practical application of their skills.

CBET provides a learner-centered approach that focusses on tangible skills and ensures that individuals are prepared for the demands of specific industries or job roles.

It is a common fact that industries are seeking for individual engineering technologists with relevant skills and qualifications for employment. At the same time, it has become a paradox that large number of universities and allied institutions produces large number of graduates that go jobless yearly irrespective of the constant complain of industries over lack of competent job

seekers. The above assertion made Olabiyi & Ipinlaye (2019) to report that engineering technologist must be technically competent and well equipped with complementary life skills to be able to secure either industrial employment or maintain self-employment. It is in line of the forgoing, that the researchers examined the fundamental principle of competency based training. Competency based educational training main principle is to ensure that individuals learners are able to perform specific tasks seamlessly in a specified job setting. Exposing building engineering technologist through competency based training will result to the possession of the right skills combination necessary to maintain self-employment.

Self-employment according to (Ashforth, 2014) refers to a work arrangement in which an individual operates their own businesses independently. Individuals in self-employment are responsible for the management of their business activities. They source for their clients/customers and provide products and services. Self-employment offers certain level of independence and autonomy. It can be pursued on a full time bases or part-time and it can involve working with team of one's employers. Self-employment has the potential for higher earnings and provides individuals with the opportunity to shape their own careers and build businesses based on strengths and interests. However, a self-employed building engineering technologist has lots of roles as well as challenges to manage in order to keep afloat in the vocation.

Building engineering technologist plays crucial role in the construction and design industry. they contribute to the planning, development and maintenance of buildings and infrastructures (Deb & Singh, 2014). They possess a combination of technical knowledge, problem-solving abilities and practical skills. A competent building engineering technologist have rich possession of architectural drafting and design, project management, robust knowledge of building codes & regulation (Jackson, 2015). Other skills and competencies basically acquired through competency-based training include, solid understanding of construction materials, technique and process, knowledge of building systems such as heating, ventilation and air-conditioning (HVAC) and building information modelling (BIM) amongst others. The acquisition of these competencies provides building engineering technologist with the necessary skills to contribute to the successful planning, design, construction and maintenance of buildings and other infrastructural projects. Hence a competent building engineering technologist is a potential job creator.

The present state of competency acquisition by building engineering technologist in Enugu state has not been promising irrespective numerous number of educational training institutions that trains students theoretically and on-the hand experiment. Efforts to close this gap necessitates the need to provide other training methods that will supplement the lecture-based training which has limitations. Thus, this necessitated this study.

Statement of the Problem

Skills and competencies acquisition, knowledge & experiences transfer, attitudes /practices dominated the engineering technology curriculum of Nigerian universities. Engineering curriculum was designed in such a manner as to equip the graduates of the programme for industrial relevance and comforting self-employment upon the completion of the programme. Irrespective of the highlighted laudable objectives of the programme, they exist high rate of unemployment by graduates of this programme (Ugwuoke, Ezeji, Edeh, & Etonyeaku, 2016). The cause of unemployment as reported by Ugwuoke et al included: lack of appropriate skills and industrial-based competencies to carry out specified job designs, poor problem solving approaches resulting from student's inability to make seamless transitions between theories and practices. The apparent lack of skills and competencies among graduates of higher institutions has been traced to the deployment of lecture teaching method which is characterized with theorization that does not cater for diverse learning styles.

To reverse the above trend being experienced by students in public universities and other higher institutions, they would be need to reposition engineering programme back to its fundamental responsibility of preparing individuals for work. It was in order to bridge this gap that industrial placement was introduced in the education of students with bias in engineering and technology to serves as a tool for acquiring appropriate work competencies and skills. However, research evidence on the resourcefulness of industrial placement in fostering employability competencies on engineering graduates suggests its unsatisfactory state in helping students acquire the necessary work competencies (Olabiyi, et al, 2019). Is it therefore necessary to examine competency-based educational training methods as a complementary teaching method that will improve students industrial based competency acquisition for self-employment of graduates? This question constitutes the problem to which the study sought to address.

Purpose of the Study

The main purpose of the study was to validate competency based educational training as a practical strategy for sustainable self-employment by building engineering technologist in Enugu state, Nigeria. Specifically, the study sought to determine:

1. Common industrial-based competencies needed by building engineering technologists for sustainable self-employment.
2. Potentials of competency based educational training in improving self-employment of building engineering technologists.

Research Questions

The following research questions guided the study:

1. What are the common industrial-based competencies needed by building engineering technologists to sustain self-employment?

2. What are the potentials of competency based educational training in improving self-employment of building engineering technologists?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

H0₁: There is no significant difference in the ratings of male and female building engineering technologists on common industrial based competencies needed for sustainable self-employment

H0₂: There is no significant difference in the ratings of male and female building engineering technologists on the potentials of competency based educational training in fostering self-employment.

METHOD

Descriptive survey design approach was adopted for the successful conduct of the study. The choice of this research design agrees with Eze (2015) who claimed that descriptive survey design is useful in exploring people's perceptions, opinions and preferences towards problems. The design also ensures extensive flexibilities in data collection and analysis. Since there is a need to determine common industrial-based competencies to improve building engineering technologist's self-employment index, the researchers therefore sought the expert opinion of building engineering technologists practicing in Enugu state ministry of works purposefully.

Area of the Study

The study covered Enugu state. Enugu state is one of the states in South-Eastern Nigeria located at the foot of the Udi Plateau. The state shares boundaries with Abia and Imo states to the south, Ebonyi state to the east, Benue state to the northeast, Kogi state to the northwest and Anambra to the west. The state is located at 6°30N of Equator and 7°30E of Latitude. The major economic activities in Enugu state is coal mining. Iron ore is also mined. Deposits of silica sand, limestone, fine clay and marble are also worked. The state is predominantly rural and agrarian, with a substantial of its working population engaged in farming, trading and provision of services. The area is also dominated by artisans/technicians and technologist that engage in various forms of handiworks such as metal fabrication, building and construction etc.

Population for the Study

The population for the study was defined as building engineering technologist engage by Enugu state ministry of works (public building & housing development departments). To ensure a representative sample was selected from the population, the researchers defined specific selection criteria used in selecting participants for the study. Building engineering technologists with a minimum of ten years practicing experience, and knowledgeable in industry competencies use and application were considered the base selection criterion for participants for the study. A total of 120 competent building technologists were purposefully selected to ensure quality data generation.

Instrument for Data Collection

The instrument for data collection was a structured questionnaire. It consists of three sections. Section A sought personal information from respondents which included; gender, rank, qualification, and years of experience. Section B contained 14 items specifically aimed at determining the common industrial-based competencies needed by a building engineering technologist. Finally, section C contained 11 items aimed at determining the potentials of competency based educational training in fostering self-employment. the questionnaire was structured along five point likert scale.

Validation of the Instrument

To ensure the validity of the instrument, the questionnaire was subjected to face and content validity. This was done to ensure that the entire questions covered the range of meanings included with the concept and that the research instrument relates to the statement of the problems, research questions and purpose of the study. Draft copies of the instrument were given to two practicing engineers in the departments of Public building and Land/Housing development of ministry works Enugu state. Expert's suggestions and recommendations were incorporated into the final draft of the questionnaire instrument. Cronbach Alpha value obtained from the instruments reliability test was 0.84.

Method of Data Analysis

Descriptive statistics was used to analyze the data. The analysis was carried out using SPSS v-25. Raw data was first coded and fed into the SPSS programme. Mean, standard deviation and t-test statistics were used to analyze the data. The cut-off set for accepting or rejecting an item was set at 3.50. Hence, items with mean values of 3.50 and above were accepted while, items below mean value of 3.50 were rejected. The hypotheses were tested at 0.05% level of significance. whenever the t-value is equal or greater than the p-critical (0.05), the null hypothesis will be accepted. The null hypotheses will be rejected when t-value becomes less than the p-critical value. Out of 120 questionnaires distributed to building technologist practicing in Enugu state, 115 were retrieved making up a 95.83% return rate.

RESULTS

Table 1: Mean and SD ratings of male and female building engineering technologist on the common industry-based competencies needed for self-employment. (N=115)

S/N	Item statements	Mean	SD
1.	Knowledgeable in interpreting building codes & regulations	4.09	0.85
2.	Knowledgeable in engineering principles	4.09	0.66
3.	Knowledge of building materials	4.31	0.65
4.	Knowledgeable in construction practice	4.17	0.69
5.	Communication & collaboration competent	2.95	0.77
6.	Proficiency in creating and interpreting building drawings	4.18	0.69
7.	Knowledgeable in project management principles	4.08	0.85
8.	Ability to prepare technical reports	2.90	0.76
9.	Knowledgeable in smart building principles	4.08	0.85
10.	Proficiency in building systems such as HVAC	4.17	0.69
11.	Proficiency in analysis of building performances	4.05	0.85
12.	Construction site knowledge & protocols	4.31	0.63
13.	Knowledgeable in green house construction	2.90	0.78
14.	Knowledgeable in building information modelling (BIM)	4.17	0.70

Table 1 shows the responses of building engineering technologists on the needed industry-based competencies to improve self-employment. The respondents agreed to all the items shown in the table 1 except items 5, 8 & 13. The findings based on the 3.50 baseline for agreement, revealed that building engineering technologists shared a common opinion on the relevant industry-based competencies such as good knowledge of construction practice, good knowledge of building material behaviour and many more as vital to maintain self-employment.

Table 2: T-test on the mean ratings of male and female building engineering technologists on common industry-based competencies needed for sustainable self-employment

Lecturers	N	Mean	Std. Deviation	t-test	df	Sig.	Dec.
Male	96	3.93	0.38	1.743	113	0.192	Do not reject H ₀₁
Female	19	3.77	0.28				

The t-value for the difference in mean ratings of male and female building engineering technologists on common industry-based competencies needed for sustainable self-employment in Enugu state was 1.743 significant at 0.192 level of significance. This value is higher than the set

level of significance of 0.05 for the study. The null hypothesis is therefore not rejected. This implies that building engineering technologists hold same opinion on the common industrial-based competencies that sustains self-employment.

Table 3: Mean and SD ratings of male and female building engineering technologists on the potentials of competency based educational training in fostering self-employment. (N=115)

S/N	Item statements	Mean	SD
15.	Development of comprehensive skills	4.07	0.85
16.	Provides specialization opportunities	4.08	0.66
17.	Ensures quality assurance	2.91	0.78
18.	Provides adaptability to industry trends	4.10	0.86
19.	Makes building technologists relevant	4.09	0.65
20.	Provides entrepreneurial skills	4.10	0.66
21.	Provides networking opportunities	2.94	0.78
22.	Fosters recognition and certification	2.85	0.87
23.	Provides marketability	4.10	0.64
24.	Provides successful self-employment	4.31	0.66
25.	Provides continued professional development	4.00	0.85

Table 3 shows respondents mean rating on the potentials of competency based educational training for sustainable self-employment, using the 3.50 cut-off point as basis for agreement on the potentials. From the mean responses it would be seen that the respondents agreed on items 15, 16, 18, 19,20, 23,24 & 25 as potentials of CBET. The respondents did not agree on items 17, 21 & 22.

Table 4: T-test on the mean ratings of male and female building engineering technologists on the potentials of competency based educational training in fostering sustainable self-employment

Lecturers	N	Mean	Std. Deviation	t-test	df	Sig.	Dec.
Male	96	3.81	0.36	0.721	113	0.612	Do not reject H ₀₂
Female	19	3.74	0.39				

The t-value for the difference in mean ratings of male and female building engineering technologists on the potentials of competency based educational training in fostering sustainable self-employment in Enugu state was 0.721 significant at 0.612 level of significance. This value is higher than 0.05 level of significance set for the study. The null hypothesis is therefore not rejected.

This implies that building engineering technologists agreed on the itemized potentials of CEBT in fostering sustainable self-employment.

DISCUSSION

The study sought to establish the utilization of competency based educational training as a complementary training strategy, required for the training of building engineering technologists in higher institutions for sustainable self-employment. Findings from the study indicated that competency based educational training is appropriate for seamless acquisition of the following industrial skills: ability to determine building materials behaviour, ability to interpret building codes & regulations, and knowledge of construction practice. Other competencies acquired through CBET include; ability to analyze building performances, knowledge of building information modelling and construction site protocols. The findings agree with what Sjo, & Hellström, T (2019) reported that competency based training promotes critical thinking, problem solving, and prepares students with skills for success in the complex world of work beyond the classroom. Furthermore, Jackson (2015) reported that combining traditional academic study or formal learning, with student exposure to the world-of-work via hands-on experiment fosters employability skills critical to student entry into the workforce and leveraging career management competencies.

Findings of the study also revealed that competency based educational training have the potentials to improve self-employment of building engineering technologists. Respondents agree that the following potentials; exposure to industrial needs & trends, career pathway revelation, development of comprehensive skills and provision of employment market are precursors to self-employment and are learnt through experience. The finding is congruent with Nwachukwu, Bakare & Jika, (2009) who reported that competencies required for sustainable self-employment are acquired through experience and training.

The findings of the study revealed no significance difference between male and female building engineering technologists on common industry based competencies needed for sustainable employment, and potentials of CEBT in fostering sustainable self-employment. This would suggest that building engineering technologists have same perception about the concept of CBET as a strategy for sustaining self-employment. The finding is consistent with the study conducted by Makhatini (2018) who reported no significance difference on common work integrated competencies acquired for sustaining self-employment. The clear implication of the findings reveals the need to adopt CBET as a complementary method of training engineering technologist in universities and other higher institutions in Enugu state to boost employability index of graduates.

CONCLUSION

The study sought to validate the concept of competency based educational training as a practical strategy for sustainable self-employment of building engineering technologists in Enugu state. The findings suggested that CBET should be adopted in the training of engineering technologist in universities and other higher institutions. This is because CBET has the potentials to reveal students career pathways, develops student's generic skills and provides employment opportunities. The study also highlighted common industry based competencies whose acquisition via CBET enhances engineering technologist's practical performances. It is the believe of the researchers that if the concept of competency based educational training approach is adopted by universities and other higher institutions tutors, it would help students to develop career path and practical skills which are requisite for self-employment.

RECOMMENDATIONS

The following recommendations are made based on the findings of the study;

1. Review of engineering technology curriculum to integrate competency based educational training to address ever changing industrial competencies should be adhered to by both NUC & NBTE. This would provide students with lifelong skills
2. Effective partnership between universities and other higher institutions and relevant industries should be encouraged. This would provide an environment for students to interact with experts such that, relevant contents that meets labour needs would be transmitted to participating students.

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