

**DETERMINATION OF EFFECTIVE EVALUATION OF QUALITY
MANAGEMENT SKILLS IN BUILDING CONSTRUCTION
TRADE IN TECHNICAL COLLEGES IN NIGERIA.**

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Abstract

The purpose of the study was to determine effective evaluation techniques that will facilitate the inculcation of quality management skills in building construction students of technical colleges in Nigeria. One research question and one hypothesis tested at .05 level of significance guided the study. A survey research design was adopted for the study and was conducted in the South East area of Nigeria. The population for the study was made up of 43 building technology teachers, 20 building construction graduates of technical colleges and 23 industrial technical education lecturers of building technology background. This gave a total population of 86 participants. The entire population was studied as it was manageable enough. A structured questionnaire which was validated by two building technology teachers, one building construction graduate and two industrial technical education lecturers was used for data collection. The Cronbach Alpha reliability coefficient was used to determine the internal consistency of the instrument and it yielded a coefficient of .62. The research question was analyzed using frequency, mean and standard deviation while the hypothesis was analyzed using ANOVA. The Scheffe post hoc test was used to compare the means of responses of the respondents where the ANOVA results revealed significant differences. The findings include the use of Self-assessment, process and product evaluation, model construction, and observational techniques as effective evaluation strategies for facilitating the inculcation of quality management skills in technical college building technology students. Following the findings, it was recommended that relevant government agencies should ensure the full integration of the techniques into the curriculum for implementation.

Introduction

The technical college is designed basically to prepare individuals for the world of work through the impartation of relevant occupational skills. According to the Federal Republic of Nigeria (FRN, 2013), the technical college is a component of Technical Vocational Education and Training (TVET), and is geared towards, among other things, giving training and imparting the necessary skills to individuals for self-reliance economically. The National Board for Technical Education (NBTE) cited in Attah, Ohanu and Nwahunanya (2018), also sees the technical college as the institution where students are trained to acquire relevant knowledge and skills in different occupations for employment in the world of work. Therefore the role of the technical college in preparing citizens for work through the inculcation of appropriate skills cannot be overemphasized. One of the trades for which skills are provided in the technical college is building construction.

Buildings do not just rise up on their own; they are achieved through a process called building construction. According to the FRN (2006), building construction is the erection,

alteration, extension and repair of a building. For Vanegas in Windapo and Omeife (2012), building construction is defined as the bridge between concept and reality while the Council of Registered Builders of Nigeria (CORBON) and the Nigerian Institute of Building (NIOB) (2010) see it as the erection and repair of immobile facilities. Therefore, building construction can be defined as the process of producing and maintaining buildings for human use. Unfortunately, the industry is plagued with so many challenges, including, public apathy to the industry (Bamisile, 2004; Jambol, 2012 and Jimoh, 2012), building collapse (FRN, 2006; Onuoha & Olunkwa, 2013 and Uzor, 2014), defective structures (Udeagwu, 2006; Bamisile, 2004), use of quacks and untested materials/products (FRN, 2006), time and cost overrun (Udeagwu, 2006), and project failure or abandonment (Udeagwu, 2006; Sanni & Windapo, 2008; and Jimoh, 2012). This goes to show that the building industry in Nigeria is in dire need of quality management practices to save it from the challenges currently confronting it.

Quality is a concept that is achieved through a systematic process called quality management. According to Weihrich and Koontz (2006), management is the process of designing and maintaining environment in which individuals, working together in groups, efficiently accomplish selected goals. Nwachukwu (2009) defines management as the co-ordination of all the resources of an organization through the process of planning, organizing, directing and controlling, in order to attain organizational objectives. Ezeji and Onoh (2008) see management in building construction as the application of knowledge and skills in the successful quality control and execution of building construction activities. Therefore quality management in building construction can be seen as the co-ordination of resources at the construction stage, in order to ensure the satisfaction of owners' requirements in terms of functionality, utility, cost and time. Weihrich and Koontz (2006) maintain that the old philosophy of adequacy, that is, maintaining the status quo for as long as a product turns a profit, must give way to a philosophy of excellence. According to Hoonakka, Carayon and Loushine (2010); Liu (2003) and Bamisile (2004), the benefits of applying quality management skills in building construction include: customer satisfaction, reduced rework, job satisfaction, and prevention of time and cost overrun. These phenomena will go a long way in improving the image of the building industry. In a study which sought to determine quality management skills for integration into the building construction curriculum of technical colleges in Nigeria, Igboko (2016) found a number of specific objectives and content for integration into the curriculum. The motivation for the study was the fact that since technical college building construction graduates serve as supervisors and foremen in the building industry (NBTE, 2007) and (CORBON, 2011), integrating quality management skills into their curriculum will place them in a veritable position to contribute meaningfully towards the achievement of the long-desired quality buildings. Among the recommendations made in the study, the author canvassed for a research to determine effective evaluation strategies to facilitate the acquisition of the said quality management skills.

Therefore, effective evaluation is necessary if curriculum objectives are to be attained. According to Okorafor (2009) evaluation is an assessment process to determine the extent to which the stated or intended objectives of a given programme have been achieved. Ughamadu (2006) sees evaluation as a strategy for identifying the strengths and weaknesses of a particular curriculum and also for improving the process of learning and instruction. According to Okoro (1994), educational evaluation serves many useful purposes such as: determining whether students understand what they are being taught, providing feed back to students on how well they are doing, helping the teacher to identify the students that need special attention, supplying information needed for programme evaluation and curriculum development, and many more. Therefore evaluation in this study can be defined as the process of assessing students in order to determine how much of the specific objectives of quality management skills in building construction have been achieved by the students and the amount of remediation needed in order to bring about deeper learning outcomes.

Yalams (2017) observes that Technical and Vocational Education and Training (TVET) of which building construction is a component adopts ineffective evaluation strategies. These ineffective strategies include: excessive use of paper and pencil, heavy emphasis on theoretical components and less on the practical performance of learners, less focus on competency-based assessment, and heavy reliance on teacher-designed or teacher-influenced students projects. Others are knowledge-based or content-based assessment, heavy emphasis on product evaluation and less on the process, and lack of opportunities for students to evaluate themselves (self-assessment). These evaluation strategies, according to the author, rub off on learning outcomes with the result that the graduates of the programme lack the capacity to perform optimally in the industry. To help arrest this situation, Yalams advocated the use of authentic or performance-based assessment, process and product evaluation, self-assessment tools and observational techniques. Further, Onwe (2004) found that the use of practical tests/demonstrations, model construction, observational techniques, written reports and oral questions/answers are effective techniques for evaluating learning outcomes in practical building construction. Okoro (1994), Anwuka (2001) and Okorafor (2009) also opine that observations, projects, checklists and rating scales are effective evaluation strategies for psychomotor activities.

Therefore, given the benefits of quality management in building construction, it becomes necessary to determine the evaluation techniques that will facilitate the inculcation of quality management skills in building construction students as evaluation influences learning outcomes positively.

Purpose of the study

The purpose of the study was to determine effective evaluation techniques that will facilitate the inculcation of quality management skills in building construction students of technical colleges.

Research Question

What are the effective evaluation techniques that will facilitate the inculcation of quality management skills in building construction students of technical colleges?

Hypothesis

The hypothesis tested at .05 level of significance was:

There is no significant difference in the mean responses of building technology teachers in technical colleges, building construction graduates of technical colleges, and building technology lecturers of industrial technical education background on the effective evaluation techniques that will facilitate the inculcation of quality management skills in building construction students of technical colleges.

Method

The study adopted a descriptive survey research design as it sought to sample the opinion of experts on the evaluation techniques suitable for inculcating quality management skills in building construction students of technical colleges. The study was conducted in the South-east geo-political zone of Nigeria. The area was considered suitable for the study as it has adequate numbers of technical colleges, building construction graduates and building technology lecturers necessary for the study. The population for the study was made up of 43 building technology teachers, 20 building construction graduates and 23 industrial technical education lecturers, giving a total of 86. There was no sampling as the population was manageable enough for the study. This is in line with Uzoagulu (2011) who opined that studying the entire population is best for a study as it eliminates sampling error. The study employed a structured questionnaire for data collection. The questionnaire had two sections. Section A sought information on the personal data of the respondents while section B required the respondents to supply information on the evaluation techniques that can facilitate the inculcation of quality management skills in

building construction students. Responses to the questionnaire items were based on a 4-point scale of Very Appropriate (VA), Appropriate (A), Moderately Appropriate (MA) and Not Appropriate (NA). The points assigned to the options were: VA=4 Points, A= 3 Points, MA= 2 points and NA= 1 point. The decision rule was that scores ranging from 0.5 to 1.49 would be considered not appropriate; those from 1.50 to 2.49, moderately appropriate; those from 2.50 to 3.49, appropriate; and those from 3.50 to 4.00, very appropriate. The instrument was validated by two building technology teachers, one building technology graduate and two industrial technical education lecturers (building technology option). Their comments and recommendations were incorporated into the final version of the instrument to enhance its effectiveness. The Cronbach Alpha coefficient was used to establish the internal consistency of the instrument and it was found to be .62. With the help of four research assistants the researcher distributed the questionnaire to the respondents in the five states of the zone through personal contact. The completed questionnaire were collected from the respondents after two weeks with a return rate of 95.83%. Frequency, mean and standard deviation were used to analyze the research question while the hypothesis was tested using ANOVA at .05 level of significance.

Results

Research Question

What are the effective evaluation techniques that will facilitate the inculcation of quality management skills in building construction students of technical colleges?

Data for the research question are analyzed and presented in Table 1.

Table 1: Mean Responses of the Respondents on the Effective Evaluation Techniques that will facilitate the inculcation of Quality Management skills in Building Construction students.

S/N	Evaluation Techniques for Inculcating Quality Management Skills in Building Construction Students.	N ₁ = 43 $\bar{X}_1$	N ₂ = 20 $\bar{X}_2$	N ₃ = 23 $\bar{X}_3$	$\bar{X}$ G	SD	RMK
1	Self-assessment of, for example, the batching and mixing of concrete constituents	2.84	2.87	3.15	2.92	1.23	A
2	Peer-assessment of, for example, the transportation and placing of concrete	3.33	3.00	3.30	3.23	0.78	A
3	Anecdotal records of students' activities during a building construction practical work	3.07	3.04	3.00	3.05	0.82	A
4	Rating scales on the planning, controlling, communicating and motivating skills for quality management	3.49	3.26	3.45	3.42	0.71	A
5	Model construction	3.57	3.39	3.50	3.51	0.70	VA
6	Checklists of labour requirements for any item of work	3.42	3.43	3.35	3.41	0.62	A
7	Observation of the techniques and procedures adopted in the storage and handling of building materials	3.58	3.52	3.35	3.51	0.59	VA
8	Projects on the acceptable standards of workmanship for different items of work	3.69	3.30	3.55	3.55	0.61	VA
9	Objective tests on the quality requirements for different building construction materials and components	3.07	3.04	3.25	3.10	0.85	A

Cluster Mean = 3.30

Key: N₁ = Building Technology Teachers, N₂ = Building Construction Graduates, N₃ = Industrial Technical Education Lecturers. $\bar{X}_1$ = mean response of Building Technology Teachers, $\bar{X}_2$ = mean response of Building Construction graduates, $\bar{X}_3$ = mean response of Industrial Technical Education Lecturers. XG = grand mean, SD = standard deviation.

The mean responses of the respondents on the effective evaluation techniques for inculcating quality management skills in building construction students are displayed in table 1. The data show that three of the items were rated very appropriate while the remaining six were rated appropriate. A cluster mean of 3.30 further confirms the appropriateness of the items as evaluation techniques for facilitating the inculcation of quality management skills in building construction students.

Again, the standard deviation of each of the responses but one was found to be less than 1.00. This shows the responses of individual respondents as clustering around the mean, thus giving the mean values added validity.

Hypothesis

The hypothesis tested at .05 level of significance was:

There is no significant difference in the mean responses of building technology teachers in technical colleges, building construction graduates of technical colleges, and building technology lecturer of industrial technical education background on the effective evaluation techniques that will facilitate the inculcation of quality management skills in building construction students of technical colleges.

Analysis of variance (ANOVA) result for this hypothesis is presented in Table 2.

Table 2: Analysis of Variance of the Responses of Respondents on the Effective Evaluation Techniques for inculcating Quality Management Skills in Building Construction students.

S/N	Evaluation Techniques for inculcating Quality Management Skills in Building Construction students	N ₁ = 43 $\bar{X}_1$	N ₂ = 20 $\bar{X}_2$	N ₃ = 23 $\bar{X}_3$	$\bar{X}$ G	SD	F-value	Sig. of F	RMK
1	Self-assessment of, for example, the batching and mixing the concrete constituents	2.84	2.87	3.15	2.92	1.23	0.46	0.63	NS
2	Peer-assessment of, for example, the transportation and placing of concrete	3.33	3.00	3.30	3.23	0.78	1.43	0.25	NS
3	Anecdotal records of students' activities during a building construction practical work	3.07	3.04	3.00	3.05	0.82	0.05	0.95	NS
4	Rating scales on the planning, controlling, communicating and motivating skills for quality management	3.49	3.26	3.45	3.42	0.71	0.79	0.46	NS
5	Model construction	3.57	3.39	3.50	3.51	0.70	0.49	0.62	NS
6	Check lists of labour requirements for any item of work	3.42	3.43	3.35	3.41	0.62	0.11	0.89	NS
7	Observation of the techniques and procedures adopted in the storage and handling of building materials	3.58	3.52	3.35	3.51	0.59	1.06	0.35	NS
8	Projects on the acceptable standards of workmanship for different items of work	3.69a	3.30b	3.55ab	3.55	0.61	3.16	0.05	Sig
9	Objective tests on the quality requirements for different building construction materials and components	3.07	3.04	3.25	3.10	0.85	0.38	0.69	Ns

Key: N_1 = Building Technology Teachers, N_2 = Graduates of Building Construction, N_3 = Industrial Technical Education Lecturers. $\bar{X}_1$ = mean response of Building Technology Teachers, $\bar{X}_2$ = mean response of Building Construction graduates, $\bar{X}_3$ = mean response of Industrial Technical Education Lecturers. XG = grand mean, SD = standard deviation, F is significant at $p \leq 0.05$.

Note: letters of the alphabet (a, b and c) indicate mean difference as determined using the scheffe test. Means with the same letterers of the alphabet are not significantly different while those with different letters are significantly different.

The analysis in Table 2 shows that there were no significant differences in the mean responses of the respondents on eight of the items that constitute evaluation techniques.

There was however a significant difference in one (item 8). Scheffe Post Hoc test was then carried out on item 8 to determine the source of the difference and the result is presented in table 3.

Table 3: Scheffe Post Hoc Test: Means of groups in Homogenous subsets in item 8 of table 2.

STATUS	N	Subset for alpha = 0.05	
		1	2
BULDING CONST. GRADUATES	20	3.3043	
IND. TECH LECTURERS	23	3.5500	3.5500
BUILDING TECH TEACHERS	43		3.6905
SIG.		.142	.399

The Scheffe Post Hoc test in respect of item 115 of table 16 whose ANOVA result was found to be significant indicates that the mean of Industrial Technical Education Lecturers ($\bar{x} = 3.55$) is not significantly different from either the mean of Building Construction Graduates or the mean of Building Technology Teachers. But the mean of the Building Technology Teachers ($\bar{x} = 3.69$), which is the highest, differs significantly from that of the Building construction graduates ($z=.30$), which is the lowest. Therefore building technology teachers, who have the highest mean, is the group showing the major source of the difference.

Discussion of Findings

The findings of the study in Table 1 showed that the nine evaluation techniques identified for the study were rated appropriate by the respondents. This therefore indicates that the use of the nine evaluation techniques was considered effective in the assessment of the inculcation of quality management skills in building construction students of technical colleges. The finding is in line with Onwe (2004) who found that practical tests/demonstrations, model construction, observations, written reports, among others, are effective techniques for the assessment of the acquisition of practical skills in building technology. The findings are also in line with Okoro (1994), Anwuka (2001) and Okorafor (2009) who pointed out that observations, projects, checklist and rating scales are effective evaluation techniques for psychomotor activities. They are equally supported by Yalams (2017) who advocated the use of competency-based assessment, process and product evaluation, self-assessment and observation techniques for skill-based learning.

Again, there was no significant difference in the mean responses of the respondents on eight of the evaluation techniques. But there was significant difference in the reponses of the respondents on one of the items (item 8). Scheffe post Hoc test carried out on the item indicates that the difference could be attributed to the marginal differences in their professional backgrounds. However, the overall ANOVA result indicates that the respondents are in

agreement on the effectiveness of the nine evaluation techniques in the inculcation of quality management skills in building construction students.

Conclusion

Evaluation in education plays many important roles one of which is to deepen learning outcomes. Unfortunately, the evaluation techniques used in the building construction programme of technical colleges are so teacher-centred that they do not facilitate the inculcation of quality management skills in students. This situation might be responsible for the increasing challenges facing the building industry as the graduates of building construction from technical colleges serve as building supervisors and foremen in the industry.

Therefore, the objective of the study was to determine effective evaluation techniques that will facilitate the inculcation of quality management skills in building construction students of technical colleges. Based on the result of the study, it becomes imperative to integrate the determined evaluation techniques into the building construction curriculum as experts have agreed on their effectiveness.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Building construction teachers should begin the use of these evaluation techniques to help in producing graduates with the quality management consciousness needed to sanitize the building industry.
2. The National Board for Technical Education (NBTE) should review the present building construction programme of technical colleges. This is with a view to integrating the determined evaluation techniques into the programme.

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