THE ROLE OF QUALITY ASSESSMENT IN IMPROVING TECHNOLOGY COMMERCIALIZATION IN NIGERIA: THE CASE OF ENGINEERING FACULTIES IN UNIVERSITIES IN IMO STATE

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Abstract
Technology commercialization is an important strategy in a dwindling economy. Quality assessment is a veritable tool in the achievement of technology commercialization. This study therefore, addressed the need for quality assessment of engineering students towards achievement of technology commercialization. One hundred and twenty (120) engineering lecturers from the Federal University of Technology Owerri (FUTO) and the Imo State University Owerri IMSU were used. Four research questions guided the study. A questionnaire of four-point rating scale was developed for data collection. The instrument was validated by four engineering lecturers from FUTO and IMSU as well as two experts in Educational Measurement and Evaluation. The reliability of the instrument was ascertained using a test-re-test measure and a coefficient of 0.83 was obtained. Mean and standard deviations were used to analyze the data collected. The findings reveal that Students Industrial Work Experience Scheme (SIWES) was effectively assessed by engineering lecturers. Another finding was that both seminar presentations and workshop practicals were not adequately and effectively assessed by engineering lecturers. The paper therefore, recommends that engineering lecturers should appreciate the need to do the needful in evaluating students seminar presentations and workshop practicals because of the role quality assessments play towards equipping engineering students with skills that will encourage technology commercialization. Also recommended was the need for Governments to adequately fund universities so that workshop practicals will be adequately and timely funded by the universities.

Introduction

Education is the bedrock for any meaningful development. Be it human, family, political, social, economic development, education plays vital roles. According to Sustainable Development Commission (2004), Education is a "framework for redefining progress and redirecting our economies to enable people to meet their basic needs and improve their quality of life, while ensuring that the natural systems, resources and diversity upon which they depend are maintained and enhanced both for their benefits and for that of future generations." With this, it then means that education can empower a person thereby making it possible for him to define his life and his world. To acquire knowledge, an individual goes through schooling where human, materials and environmental requirements are put in place to achieving this goal. The human requirements are the teachers, lecturers, tutors, instructors and technicians who go through the contents with the learners. Materials and equipments such as, laboratories, studios, and consumables are usually needed in the pursuit of knowledge through education. Of course there is the need for enabling environment such as classrooms, good seating spaces, tables, chairs, ventilation, good lighting. All these put into place should enhance teaching-learning. Teaching and learning is not complete without evaluation. Evaluation of learning is achieved through the use of assessments. These series of assessments according to Onyeka and Dara (2016) is achieved through the use of different assessment procedures. With this in mind, the teacher is

expected to periodically assess the learner during an exposure to a unit of course (formative evaluation) or at the end of term or semester (summative evaluation).

Assessment of learning is an important tool employed by any good educator to monitor teaching and learning and is achieved through different methods such as the use of quizzes, testing, seminar presentations, workshop practicals, use of assignments. Whiston (2000) maintained that any method of assessment employed by an evaluator should be valid. This helps the educator to ascertain if objectives of the units are being achieved or not since the main aim is to monitor teaching and learning. The information gathered quickly leads the teacher to take certain decisions for example to re-teach, change teaching skills or approaches where necessary as well as to provide individualized and remedial instruction. All these are geared towards making the learner 'strong' at the end. Where an educator fails to do this, the outcome could be disastrous. Summative evaluation comes at the end and mainly used to ascertain mastery at this point and also used for certification. At this level, judgments are placed on the learners performances. There must be clear-cut statements by the teacher or institution regarding the learner. His grades are stated and remarks made regarding these grades. Here, the learner must know whether he has passed or failed, completed the level and should be promoted to the next level, to graduate or not to graduate. There is a definite statement regarding the learner. To achieve these, quality assessments are important.

Quality assessment connotes assessments that are put in place to ensure that evaluations made regarding a learner are such that cannot mislead the Evaluator. According to Onyeka and Onuekwusi (2016:5), "Quality assessment is the bedrock of any meaningful evaluation." Therefore, for us to categorically take a decision regarding academic achievements, we must make sure that the assessment strategies employed have quality. At any sphere of education, quality assessment remains the ideal thing because learners must be adjudged based on unflawed assessment information. For instance, at the tertiary level, assessments should be such that will enhance the 'making' of a sound and well developed individual that can fit into any society he finds himself.

Tertiary education ushers an individual into careers. At this level, students are gradually getting into adult life. He is being prepared to face the realities and challenges of life. This level determines to a great extent the person's livelihood. Career actualization as well as career progression becomes more realistic at this level. It is pertinent therefore, that assessment of learning is done with the intention of ushering in a 'total' person to the field of work whether for paid employment or self employment. At the end of university education, where mastery has been achieved and internalised, the individual can effectively fit into the society. A cursory observation of what happens at job situations and offices leaves much to be desired. Sometimes, the performances of these graduates' leave one to imagine what transpired during tutelage/pupilage more especially in assessments and evaluation of these graduates. Assessments could come in form of practicals, presentations, term papers, seminar papers and projects. Such careers that are practical oriented like Engineering demands that assessment of learners should to a great extent employ practical assessments.

Engineering is an applied science that deals with the design and construction of machines and general facilities with economy. It is practically oriented and therefore, the products are practically oriented individuals who can innovate, invent and develop machines and general facilities at reduced costs. Good engineering practice has to do with technical activities that ensure that a company manufactures products of the required quality as expected. If this is achieved during schooling, no doubts the young engineer will contribute in technology

commercialization. There are many areas an engineer can function viz; production, construction, food beverages, industries, electrical electronics, agriculture, aeronautics, marine, polymer.

Technology commercialization has to do with inventors employing their skills in order to invent and develop products which could be licensed to another person, groups, institutions and the society at large in order to be self sustained and for the sustainability of the economy at large. Onyeka (2013) is of the view that commercializing technology is a sine-qua-non for emerging economies. Golob in Noorlizawati, Zainab and Astuty (2014) maintain that commercialization of intellectual property or technology transfer has been viewed as engines of economic growth and also deemed important in creating a sustainable entrepreneurial environment. Onyeka (2012) opined that if graduates of engineering are trained to acquire skills that will aid them in commercializing technology they could contribute their quota in ameliorating economic meltdown, employ others as young entrepreneurs so as to assist in achieving the Sustainable Development Goals (SDGs) of vision 2030. In lieu of this, Google.com talking about process in technology commercialization emphasised in step three the need for procedural assessment. Therefore, assessment strategies in the engineering faculties should be such that would make the young engineer an efficient, innovative, astute researcher and developer. This can be achieved through proper assessment of students Industrial Work Experience Scheme (SIWES), seminar presentations, workshop practicals, projects etc. If these exercises are properly supervised and assessed, evaluation made upon them should place the students in a better stand that will enable them do the needful for themselves and the society at large thereby contributing their quota towards technological commercialization. The crux of the matter is that if during tutelage/pupilage, the assessments are not properly carried out, we may be working with flawed information during evaluation of prospective engineers thereby producing half baked engineers. It also means that they will not have much to contribute to dwindling economy like ours more so at this period of economic recession. During convocation ceremonies, universities make declarative statements that the graduands have been found worthy in character and in learning. Fine! Why then should these young engineers not contribute effectively in technology commercialization? Could it be that leaning did not take place? Could it be that poor teaching skills were employed? Could it be that teachings were mostly theorized rather than practicalized? Could it be that the assessment strategies employed in evaluating them were such that were mis-leading? These and more are the worries of these Researchers.

The objectives of the study are:

(i) To determine the level of assessments carried out during students Industrial Work Experience Scheme (SIWES) of engineering students towards achieving technology commercialization.
(ii) To ascertain the level of using seminars in assessing engineering students towards achieving technology commercialization.
(iii) To find out the efficacy of using workshop practicals in assessing students towards technological commercialization.
(iv) To investigate engineering students projects assessment as a reflection of the skills acquired for technological commercialization.

Research Questions

The following research questions guided the study:

(i) What is the level of assessment for engineering students Work Experiences (SIWS) towards achieving technology commercialization?

(ii) To what extent do the use of seminars serve the purpose of assessment of engineering students towards technology commercialization?
(iii) How effective are the use of workshop practicals in assessment of engineering students towards achieving technology commercialization?
(iv) To what extent does engineering students' project assessment reflect the skills acquired for technology commercialization?

Methods

The study is descriptive and so employed a survey descriptive design. A simple random sampling technique was used to select a sample of 120 engineering lecturers from Imo State University and Federal University of Technology Owerri, Imo State. The lecturers were considered to supervise and assess project, seminar presentations, workshop practicals and SIWES and so could effectively respond to the items of the questionnaire. The instrument was a four point rating scale questionnaire of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). Another response were Very High Extent (VLE), High Extent (VE), Low Extent (LE) and Very Low Extent (VLE). The responses were weighted 4 points, 3 points, 2 points and 1 point respectively for positively keyed items and the weighting reversed for negatively keyed items. Both the face and content validity of the instrument were ascertained by presenting it to three experts in measurement and evaluation in education and three engineering lecturers, two each from the two universities used in the study. Their corrections and observations were effected. A reliability coefficient of 0.83 was obtained using the test-retest method which shows that the instrument was reliable and could be used for the study. Mean statistics was used to analyze the data and a criterion mean of 2.50 was set for the acceptance or otherwise of the item means and cluster means. Data were presented using tables.

Results

Research Question One: what is the level of assessment of engineering students Industrial Work Experience Scheme (SIWES) towards technology commercialization?

Table 1: Mean and standard deviation of assessment of engineering students Industrial Work Experiences Scheme (SIWES)

S/N	SIWES Assessment		SA	A	D	SD	$\bar{X}$	S	Decision
1	My students go through SIWES	n	84	15	15	6	3.48	2.61	+
		nx	336	45	30	6			
2	I adequately supervise them by visiting their SIWES sites	n	30	48	20	12	2.63	1.41	+
		nx	120	144	40	12			
3	During supervision, students are properly assessed.	n	30	60	15	15	2.88	2.13	+
		nx	120	180	30	15			
4	These assessments help improve their skills	n	39	60	3	18	3.00	1.91	+
		nx	156	180	6	18			
5	SIWES desk officers at the sites do the supervision and assessment	n	15	72	12	21	2.68	1.42	+
		nx	60	216	24	21			
6	Students are not found at SIWES sites and therefore no assessments	n	36	12	42	30	2.64	1.82	+
		nx	144	36	84	30			
	CLUSTER MEAN = 2.94								

Results in table 1 indicated that engineering lecturers make effective use of SIWES in assessing students. The cluster mean is 2.94 with all the item means exceeding 2.50 which was set for the acceptance or otherwise of the mean values.

Research Question Two: To what extent do seminars serve the purpose of assessment of engineering students for technology commercialization?

Table 2: Mean and standard deviation of the extent of use of seminars in assessment of engineering students

S/N	SIWES Assessment		VHE	HE	LE	VLE	$\bar{x}$	S	Decision
1	I realize that seminars are good strategies for effective assessment	n	66	36	06	12	3.30	1.79	+
		nx	264	108	12	12			
2	Periodic seminar presentations are proper assessed.	n	20	40	18	42	2.32	1.37	-
		nx	80	120	36	42			
3	Time factor is a hindrance to assessment of seminars.	n	15	69	27	9	2.30	2.10	-
		nx	15	138	87	36			
4	Students are not usually prepared for seminars and therefore no assessment.	n	75	20	12	13	1.69	1.34	-
		nx	75	40	36	52			
	CLUSTER MEAN = 2.40								

The analysis in table 2 shows that the lecturers do not make adequate and effective use of seminars in assessment of engineering students since the cluster mean for the research question is 2.40 with all the item means falling below the criterion mean of 2.50 except item one that has a mean of 3.38.

Research Question Three: How effective are assessments of engineering students towards technology commercialization based on workshop practicals?

Table 3: Mean and standard deviation of assessment of engineering students based on workshop practicals

S/N	Assessment of Workshop Practicals		SA	A	D	SD	X	S	Decision
1	I realise that hands on tools is a suitable strategy for quality assessment	n nx	69 276	30 90	12 24	15 15	3.37	2.11	+
2	Funds are available for students workshop practicals	n nx	9 36	42 126	60 120	09 09	2.43	1.61	-
3	Students procure materials for their workshop practicals.	n nx	27 108	57 171	15 30	21 21	2.75	2.16	+
4	Each workshop practical is properly assessed.	n nx	39 156	42 126	24 48	15 15	2.38	1.88	+
5	Workshop practicals are not properly carried out due to funds and therefore assessments improper. **CLUSTER MEAN = 2.82**	n nx	30 120	33 99	42 84	15 15	2.65	2.26	+

From table 3, it is observed that engineering lecturers realize the need to effectively assess workshop practicals with the cluster mean of 2.82. All the items have means above 2.50 which is the criterion mean except item two with a mean of 2.43.

Research Question Four: To what extent does assessment of engineering students represent the skills required in attainment of technology commercialization?

Table 4: Mean and standard deviation of assessment of engineering students' projects

S/N	Assessment of Project		SA	A	D	SD	X	S	Decision
1	Each stage of students' projects is properly supervised and assessed.	n nx	42 168	39 117	24 48	15 15	3.48	2.31	+
2	Only completed projects are assessed	n nx	36 36	39 78	18 54	27 108	2.30	1.72	-
3	Projects are presented before a panel and scored.	n nx	60 240	27 81	18 36	15 15	3.10	2.42	+
4	Factors such as time and funds hinder proper assessments of projects	n nx	70 70	30 60	7 12	16 64	1.76	1.13	-
5	Students engage others to prepare their projects and therefore, no formative assessments	n nx	70 70	35 70	10 30	05 20	1.58	1.11	-
	CLUSTER MEAN = 2.42								

Results in table 4 indicates that assessment of project by engineering lecturers do not effectively represent the skills required. The clusters mean 2.42. Except item one and item three that obtained means above 2.50, others had means very much below the decision mean of 2.50. This reveals that only completed students projects were accessed, time and funds are hindrances to projects assessment.

Discussion

In research question one, the study sought to find out the level of assessment of engineering students in students Industrial Work Experience Scheme (SIWES). It was revealed that engineering lecturers value the need to carry out proper assessment of SIWES because all the item means and cluster mean were all above the criterion mean. This is encouraging because SIWES is aimed at exposing students to machines and other equipments that are in the industries and the practical application of all the theories of the classroom. It is a skill training programme designed to expose and prepare students of universities and other tertiary institutions for the industrial work situation they are likely to meet after graduation. It is a training programme and if effectively supervised and assessed, the evaluation we make will be able to empower the student engineers with knowledge and skills that will assist them towards technology commercialization. In support of this, Yabatech online informs that the aim of SIWES established in 1973 by the Industrial Training Fund (ITF) is to bridge the gap between the skills which the labour market required with that of those acquired by the graduate students. This of course encourages technology commercialization since it exposes students to the industrial experiences and enable them develop occupational experiences so that they can really contribute their quota to national economic and technological development after graduation.

Another revealing finding is the use of seminar assessments on engineering students. This research question has a cluster mean of 2.40.This is not heart warming that the engineering lecturers do not do the 'right' things towards seminar assessments. Seminar presentations apart from fostering good oral presentation, enables the students to have greater knowledge of the topic since they need to adequately prepare for the presentation. Although, the lecturers realize the need for seminar presentation with an item mean of 3.38, other items reveal sickening findings with very low means. This shouldn't be since those presentations handle topics/units that will make them efficient engineers on graduation. Collaborating, Onyeka, (2011) emphasizes the need for seminar presentations to encourage Biotechnology commercialization by students. This is interesting because these seminars are part and parcel of students' curriculum and should be implemented to the letter if our technology will be commercialized and this lies mostly with the training of vibrant and skilful engineers that will be able to face the challenges and realities of technology commercialization.

Engineering is all about apprenticeship. To do this, observation and hands on tools are eminent. The third research question investigated assessment of engineering students' workshop practicals. The finding here is impressive with a cluster mean of 2.82. All the items had their mean values above criterion mean except the item that sought to ascertain the level of hindrance associated with funding of workshop practicals. These workshop practicals are very important if these prospective engineers would adequately perform on graduation. According to Onyeka (2012) students competence in handling works in engineering is a step in the right direction towards technology acquisition, since this finding reveal that engineering lecturers employ varied assessment strategies in evaluating engineering students' workshop practicals. This of course, will empower them with such skills that will encourage them towards achieving technology commercialization.

The fourth research question sought to ascertain level of assessment of engineering students' project towards achieving technological commercialization. This finding was discouraging because the cluster mean fall below the decision mean. Project writing is a veritable means of allowing students discover things themselves under the supervision of a supervisor as Onuekwusi and Onyeka (2017) are of the view that projects are means to internalizing experiences. Project writing is rigorous and therefore requires the patience of both the supervisor and the supervisee. The students in agreement with the supervisor decide on the topic and the student is encouraged to get on. For students of engineering, project writing is very important because hands on tools is the bone of contention. It is surprising therefore, that engineering lecturers are not living up to expectation in this regard. These projects if properly supervised and assessed may become a start-up for these perspective engineers towards technology commercialization. Google search upholds that if engineering projects are fully and effectively assessed, the students will easily enter into the world of work, whether paid or self employed. This also means that they will be able to contribute to technology commercialization.

Conclusion

The objective of this study was to find out if engineering lecturers in the two universities in Imo State employ assessment strategies that could effectively lead to students' involvement towards technology commercialization. The four assessment areas studied were; use of SIWES, use of seminar presentation, use of workshop practicals and assessment of students projects. The findings showed that assessment of SIWES and assessment of workshop practicals are effectively assessed while assessment of seminars and projects are not encouraging. Recommendations were therefore made based on these findings.

Recommendations

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

(i) Engineering Lecturers should continue to appreciate the need for proper assessment of Students Industrial Work Experiences Scheme (SIWES) as a veritable tool for acquiring skills for technology commercialization.

(ii) Engineering lecturers should endeavour to employ assessment of seminars by students as a move in the right direction for technology commercialization.

(iii) Engineering lecturers should employ varied assessment techniques that will further enhance adequate evaluation of the students.

(iv) Government should fund institutions so as to enable the institutions fund Engineering faculties more especially in the area of students workshop practicals.

(v) Engineering lecturers should realize the need to properly supervise and assess their students' projects because when they 'do it themselves', they tend to retain what they have learnt and therefore could transfer the knowledge to technology commercialization.

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