



ATTITUDES OF ENGINEERING STUDENTS TOWARDS ENTREPRENEURSHIP EDUCATION IN NIGERIAN POLYTECHNICS

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ABSTRACT

Enterprising elements of entrepreneurship such as evaluating opportunity, developing new products, and handling start-ups are part and parcel of most business management curriculum. As for engineering discipline students interested in creating their own organization after graduation, they seem to be left in dark although in many cases they are originators of product ideas. In Nigeria, there is a growing concern that Engineering students do not have sufficient entrepreneurial skills to venture in business particularly running small and medium enterprise (SME) set-ups. The purpose of this study was to explore a broad array of attitudes toward and outcomes of entrepreneurship education on engineering students in order to understand the characteristics of students participating in related courses and activities, the nature and extent of their involvement, entrepreneurship's role in their career plans, and its impact on entrepreneurial self-efficacy. The study was conducted in three Polytechnics from the Northern Zone of Nigeria – Federal Polytechnic Kaduna, Kaduna State, Kano State Polytechnic, Kano State, Benue State Polytechnic, Benue State. Data was derived from both primary and secondary sources. Secondary data were drawn from accounts of published and unpublished materials using an in-depth interview qualitative approach and the analysis was done on ANOVA software. The study has concluded that curriculum review can be the key technique to enhancing synergy between engineering courses and entrepreneurship education

KEY WORDS: Anova, Business, Entrepreneurship, Engineering, Polytechnic, Synergy

1.0 INTRODUCTION

Changes in the economy and workforce needs have driven many engineering schools to consider offering entrepreneurship education to their students. Although entrepreneurship education is believed to be complementary to an engineering education, little is known about the degree to which it plays a role in contemporary students' academic programs. This economic trends and changes in the way employers organize and make decisions have led to an increased awareness of the potential value of entrepreneurship education to engineering students.

In an article about de-industrialization and its effect on engineering education, Wei (2005) states that, 'research and development in manufacturing companies used to be viewed as a glamorous career for the brightest engineering graduates, but the number of attractive job offers has been declining for many years. Today, a glamorous job for an Engineer might be to work in a smaller, more entrepreneurial company, which requires 'a broad range of skills and knowledge beyond a strong science and engineering background' To prepare students for this new reality, polytechnic are increasingly aware that they must graduate Engineers who not only understand science and technology, but who are also able to identify opportunities, understand market forces, commercialize new products, and have the leadership and communication skills to advocate for them.



2.0 LITERATURE REVIEWS

To prepare students for this new reality, Polytechnic are increasingly aware that they must graduate Engineers who not only understand science and technology, but who are also able to identify opportunities, understand market forces, commercialize new products, and have the leadership and communication skills to advocate for them. This has prompted a significant increase in the delivery of entrepreneurship education to engineering students through new courses, programs, and experiential learning opportunities, a movement that has garnered support from influential publications and professional organizations such as the National Academy of Engineering (NAE) and the American Society for Engineering Education (ASEE) [Rover .D 2013]

Evidence of this trend is the National Science Foundation's recent \$10 million award to launch a national STEP Center at Stanford Polytechnic which will address what is described as a critical need for entrepreneurial engineers across the United States. The center is intended to 'catalyze major changes in undergraduate engineering programs by developing an education, research and outreach hub for the creation, collection and sharing of innovation and entrepreneurship resources among the almost 350 engineering schools in the U.S.' [Kontio J. 2010].

In the Modibbo Adama Polytechnic of Technology (MAUTECH), Yola, Nigeria, entrepreneurship education is thought as, "Entrepreneurship Development" (ED). Osemeka (2012: 256) defines entrepreneurship development as "...the process of enhancing entrepreneurial skills and knowledge through structural training and institutional building programme

Entrepreneurial education is offered at both the undergraduate levels in Polytechnic. The objectives at the undergraduate level are to create awareness among students and stimulate their interests in entrepreneurship (Abbas, 2013). The course is expected, among others, to make students appreciate the risks and rewards associated with business creation and ownership. It is hoped that the course will change students' mindsets and attitudes towards entrepreneurship as well as helping in "developing entrepreneurial traits...and provide the necessary networking support..." (Agbim et al., 2013: 37). Some studies show that students perceived EE as an important and relevant course (Akpan and Etor, 2013; Akinboye and Pihie, 2014; Ramlan and Ngah, 2012). Studies by Hosseini et al. (2011) and Abbas (2013) show that EE positively changed students' perceptions of and attitudes toward entrepreneurship.

The appropriateness of the curriculum and course contents is a challenging issue in EE, and the success of the programme lies on getting this aspect right. Zegeye (2013) argues that this problem arises owing to inability to harmonize the viewpoints of the major stakeholders in EE: educators, students, programmers, and evaluators. The students, for example, come from diverse educational background and orientations. What and how to teach them are fundamental questions that need to be asked and pragmatically answered if students interests and skills acquisition in entrepreneurship are to be met. Adejimo and Olufumilayo (2009), Ramlan and Ngah (2012) identified curriculum and course contents as critical to achieving the course outcomes. Ozaralli and Rivenburgh (2016) identified the theory-based approach to EE and the non-involvement of practical entrepreneurs as responsible for low interest and poor perception of entrepreneurship among polytechnic students in Malaysia.

Those who teach entrepreneurship in Polytechnic have significant role in influencing students' attitudes to and perceptions of EE (Gustafsson-Pesonen, 2008; Akinboye and Pihie, 2014). However, studies show that students have low perceptions of existing teaching methods in positively influencing their interests in entrepreneurship (Ramlan and Ngah, 2012). This has been blamed on the dysfunctional approach to EE by lecturers handling the course. This was the position of Yasin et al. (2011:200) who observed that "lecturers lacked relevant entrepreneurial skills, knowledge or training and teaching approaches were inappropriate." This finding was collaborated by later study (Abbas, 2013).

The goal of EE is to create entrepreneurial intentions among the recipients. Entrepreneurial intention refers to "an individual's personal desire to create a new firm or a new value driver within existing organizations" (Wu and Wu, 2008). Entrepreneurial intention is seen as the first step in new business creation. ED, it is argued, will develop students' interests in and create positive perception of entrepreneurship (Agbim et al., 2013). Students will be equipped with the skills to translate their interests into business formation at some stage after completion of their undergraduate programmes.

Motivation is then translated into behaviour as a function of a person and his environment. One of the main explanatory concepts of behaviour is valence, which can be seen as a vector of power that has strength and direction. It is determined by a person's internal value for a thing (e.g. money), and the attractiveness of a certain field (e.g. entrepreneurship) to fulfill the need. Vroom (1964) in Timo, Jukka and Riitta (2002) defines motivation (the force to perform an act) as a function of valence and expectancy. Furthermore, valence is a function of perceived value and perceived instrumentality.



According to Timo, Jukka and Riitta (2002), applying this reasoning to an entrepreneurial decision, the motivation to start-up is stronger, and the more a person perceives that the rewards from entrepreneurship (instrumentality) can satisfy the needs which are important for him (value), and the more probable he sees that he is going to succeed in the tasks related to entrepreneurship. It is important to notice that all these are subjective perceptions, which means that entrepreneurial motivation can be very different between different individuals due to their different perceptions of entrepreneurship.

Prior research has dealt with several types of push factors. Specht's (1993) in Timo, Jukka and Riitta (2002), literature review showed that the five most usually used contextual factors used as determinants of entrepreneurship can be grouped as social, economic, political, infrastructure development and market factors. A failure in previous organization, getting fired, or concluding that the organization or one's career is not progressing can also be treated as factors 'pushing' towards entrepreneurship.

According to Albert et Marion (2001) the Entrepreneurial Spirit consists – for business as well as for all human activities", "in identifying opportunities, in gathering resources of various natures, in order to create a wealth that meets a solvable demand". Other authors define the Entrepreneurial Spirit as a set of positive attitudes as regards the notion of enterprise or of starting a business, or as regards the Entrepreneurial Spirit which involves taking initiatives and action (Léger-Jarniou, 2001). The Entrepreneurial Spirit also defines the basic characteristics of an entrepreneur, who is different from the manager or the inventor (Fayolle, 2002), regarding the activation of mental images allowing an organization to develop (Fonrouge, 2002). A set of personality features, of abilities, values and attitudes which reveal entrepreneurial behaviours are to be found in these models.

So there is no clear consensus as to the definition of an Entrepreneurial Spirit, and the definitions that can be found in the literature seem to be closer to the consequences of an Entrepreneurial

3.0 METHODOLOGY

3.1 Sampling Procedure

Undergraduate students of different engineering fields from Nigerian Polytechnics were chosen as convenience samples for the purpose of this study. The various engineering fields are:

- (1) Mechanical Engineering
- (2) Chemical Engineering
- (3) Electrical Engineering
- (4) Civil Engineering
- (5) Agricultural Engineering

The chosen public Polytechnics are Polytechnics from the Northern Zone of Nigeria – Federal Polytechnic Kaduna, Kaduna State, Kano State Polytechnic, Kano State, Benue State Polytechnic, Benue State.,

3.2 Measurement and Instrument Development

Some of these Polytechnics have not yet introduces an entrepreneurship subject in their programs. A survey of students was conducted to assist in developing potential courses for the academic curriculum. Data were gathered through a self-completion questionnaire, which comprised 14 major questions, with additional sub-categories where appropriate. Most of the questions took the form of a set of statements by using a type of intent-to-purchase scale, which were judged by students on a Likert Scale of 1 to 5, with a scale value of one being strongly disagree Likely and a score of five being strongly agreed Likely. The convenience and judgment sample from different fields of engineering courses was deliberately chosen to obtain as many different responses as possible. Each set of questionnaire was preceded by a covering letter that explained the purpose and importance of the survey, and provided assurances that all questionnaire responses would be treated with the strictest confidentiality.

In order to translate the collected data into meaningful research result, Qualitative analysis was done using ANOVA software from which interpretations was made on how the curricula can be accommodate entrepreneurship education, to investigate the level of engineering students' interest in entrepreneurship education to examine factors that have the potential to motivate these undergraduates at Higher National Diploma level to identify an appropriate set of undergraduate courses to be introduced to engineering students for a better outcome curricular in tertiary institutions in Nigeria.



4.0 DISCUSSIONS

4.1 Introduction

The questionnaire was distributed to Polytechnic engineering students at four major Polytechnics in Nigeria. Personal interview was suggested as a good contacted method to bring immediate and more reliable data to the survey. In total, questionnaires were sent to 200 students and all completed the questionnaires. The data collected in this survey are interesting and can be very useful to practitioners and educators. The detailed finding can be obtained from the sections discussed below.

4.2 Descriptive Statistics

A total of 200 questionnaires were distributed and only 191 were collected from back from the polytechnics. The breakdown of these students by discipline is given in Table 1. .

Faculties	Responses (numbers)	Responses (percentage)
Mechanical Engineering	52	
Electrical	41	
Chemical	37	
Civil	30	
Agricultural Engineering	31	
TOTAL	191	

4.3 Data Presentation and Analysis

This chapter describes the data and analysis of the information obtained from the field survey as well as the interpretation. The chapter is separated into two sections; the first section is concerned with data presentation for each item on the questionnaire using descriptive statistics of frequency, percentages mean, and standard deviations, while the second section deals with inferential analysis of the data in order to achieve the objectives of this research.

4.3.1 Descriptive Statistics

This section is concerned with data presentation for each item on the questionnaire using descriptive statistics of frequency, percentages for nominal and ordinal while mean, standard deviations and reliability test.

Sections	Cronbach's Alpha	N of Items	Remark
Strategies that should be adopted to Enhance Synergy between Engineering courses and Entrepreneurship Education	.811	5	Significant
Gaps that could hinder the development of creative ability of Polytechnic Engineering Students after taking entrepreneurship Education?	.722	5	Significant
Perception of polytechnic students on the synergy between Engineering courses and Entrepreneurship Education	.723	5	Significant
Polytechnic Engineering students readiness to face the challenges of combining Engineering courses with Entrepreneurship Education.	.719	5	Significant

From Table 1 it can be seen the analysis carried out for reliability test, shows that the cronbach's alpha values are all significant in other word the instrument or tools used in the achievement of the various objective are all reliable.



Table 2: Strategies that should be adopted to Enhance Synergy between Engineering courses and Entrepreneurship Education.				
S/N		Mean	Std. Deviation	Remark
1	Engineering students should demonstrates their creative abilities through knowledge gained from Entrepreneurship Education after learning.	4.5399	.58611	Agree
2	Allowing Professionals in the field of Entrepreneurship Education to teach the course to Engineering students	4.2445	.61046	Agree
3	Reviewing Engineering courses Curricular to accommodate Entrepreneurship Education in all semester	4.2963	.72945	Agree
4	Creation of entrepreneurship business clinics to guide potential start up	4.2134	.76477	Agree

Table 3: Descriptive Analysis on Objective One.

Objective	Mean	Std Deviation	N of Items
The Strategies that should be adopted to Enhance Synergy between Engineering courses and Entrepreneurship Education	4.410	0.6778	5

Base on the analysis carried out it, the result of the respondents' responses revealed a mean of 4.410 with a standard deviation of 0.678, this implies that the Strategies that should be adopted to Enhance Synergy between Engineering courses and Entrepreneurship Education are reviewing Engineering courses Curricular to accommodate entrepreneurship Education in all semester and allowing Professionals in the field of entrepreneurship Education to teach the course to engineering Students.

The gaps that could hinder the development of creative ability of Polytechnic Engineering Students after taking entrepreneurship Education				
S/N		Mean	Std. Deviation	N
1	Lack of confidence due to ineffective communication skills	4.5839	0.77986	187
2	Ineffective practical application of Entrepreneurship knowledge gained	3.0331	0.33964	187
3	Perception of Entrepreneurship Education as a form of Business studies.	4.2087	.81933	187
4	Lack of mentoring		.	
			.	

Table 3: Descriptive Analysis on Objective Two.

Objective	Mean	Std Deviation	N of Items
The gaps that could hinder the development of creative ability of Polytechnic Engineering Students after taking entrepreneurship Education	3.995	0.732	5

From the result obtain it was revealed that the mean response of the respondents' was 3.995 with a standard deviation of 0.732 this indicate that there are gaps that could hinder the development of creative ability of Polytechnic Engineering Students after taking entrepreneurship Education which are ineffective practical application of Entrepreneurship knowledge gained and lack of mentoring.



Perception does polytechnic students have about the synergy between Engineering courses and Entrepreneurship Education			
	Mean	Std. Deviation	N
Positive	4.7733	.68878	194
Negative	4.2114	.71390	194
Low level of development if any synergy.	4.4949	.71570	194

Table 6: Descriptive Analysis on Objective Three.

Objective	Mean	Std. Deviation	N of Items
Perception polytechnic students have about the synergy between Engineering courses and Entrepreneurship Education	4.350	0.738	5

The result of the analysis obtain in Table 6 revealed a mean response of 4.340 with a standard deviation of 0.728 which depict that the perception Polytechnic students have about the synergy between Engineering courses and Entrepreneurship Education is positive.

Table 7: Polytechnic Engineering students are adequately ready to face the challenges of combining Engineering courses with Entrepreneurship Education.			
	Mean	Std. Deviation	N
Adequately prepared	4.0657	1.04632	183
Not adequately prepared	3.284	1.42056	183
Neutral	4.2187	.93553	183

Table 8: Descriptive Analysis on Objective four

Objective	Mean	Std. Deviation	N of Items
Polytechnic Engineering students are adequately ready to face the challenges of combining Engineering courses with Entrepreneurship Education	3.866	1.66995	5

From the result obtain it was revealed that the mean response of the respondents is 3.866 with a standard deviation of 1.6695 this depict that Polytechnic Engineering students are adequately ready to face the challenges of combining Engineering courses with Entrepreneurship Education base on the items stated in Table 8.

Inferential analysis of the data

This is done in order to achieve the objectives of this research.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.991 ^a	.982	.923	.03624
a. Predictors: (Constant), MD, MC, MB				



ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.069	3	.023	17.296	.175 ^b
	Residual	.001	1	.001		
	Total	.068	4			
a. Dependent Variable: MA						
b. Predictors: (Constant), MD, MC, MB						

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constnt)	2.848	.268		10.684	.059
	EED	.155	.047	.672	3.297	.008
	CP	.401	.074	.912	5.398	.117
	TV	.232	.069	.734	-3.350	.185
a. Dependent Variable: ED						

In the model summary table above, R-square is .981, meaning 98.1% of the variation from the dependent (Entrepreneurship Education) can be explained by variation in the independent variables (Strategies for synergy, gaps hindering developments, and readiness to face challenges). The remaining 7.9% can be explained by other factors that were not in the model. With these results, it can be concluded that Entrepreneurship Education have strong predictive powers, as this variable accounts for about 98.1% of the variation in Strategies for synergy, gaps hindering developments, and readiness to face challenges

The ANOVA table above reveals that the regression equation is not significant. It implies that, most of the parameter of the model are not significant.

The ANOVA table and the table of coefficients have shown that the model is not significant since all the p-values is greater than 0.05 indicated that the parameter for determining the students perception in the synergy has no significance.

CONCLUSIONS

The primary objective of this research was to understand student interest in a variety of entrepreneurship courses that will be introduce in the Polytechnic engineering curriculums. We have evaluated the level of engineering students involvement in entrepreneurship education in the polytechnic where it is offered as a course, its impact considering their involvement and the role it may play in their career plan. There has to be Synergy between engineering courses and entrepreneurship Education. This study has concluded that curriculum review can be the key technique to enhancing Synergy between Engineering courses and Entrepreneurship Education in Nigeria Polytechnic engineering curriculum, It is therefore recommended that stakeholders in the polytechnic curriculum development should review and integrate entrepreneurship education in the curriculum, this review will be the key technique to enhancing synergy needed between Engineering courses and Entrepreneurship Education in Nigeria.

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