

## ENHANCING ENTREPRENEURIAL SKILLS OF UNDERGRADUATE SCIENCE, VOCATIONAL AND TECHNICAL EDUCATION STUDENTS THROUGH ENTREPRENEURSHIP EDUCATION

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### ABSTRACT

*This paper examines the contribution of entrepreneurship education course towards cultivating entrepreneurial skills of undergraduate Science, Technical and Vocational students. The subjects consist of 309 students from the School of Technology Education. Entrepreneurial skills development assessment questionnaire (ESDAQ) was used for data collection. The ESDAQ was validated by experts and internal consistency of 0.80 was obtained using the Cronbach's Alpha method. The t-test and ANOVA were used for testing hypotheses at the 0.05 significance level. The study reveals that students' participation in the entrepreneurship education during their undergraduate education stimulates the acquisition of entrepreneurial skills. Entrepreneurial skills of technical education students is higher compared to vocational and science students. Diversification of instructional approach in teaching entrepreneurship education was recommended, especially the use of experiential learning methods interchangeably with the conventional style.*

**Keywords:** Science, Technical and Vocational Education, Entrepreneurship Education and Entrepreneurial Skills

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## 1 INTRODUCTION

Currently, the demands in the world of work are constantly and rapidly undergoing changes. This has made many workplaces adopt new dimensions and magnitudes of job skills for their prospective employees. Today's workplaces, including Personal business organizations require a well-trained technical expertise that is entrepreneurial trained for the fast changing global economy (Essia, 2012; Seet & Seet, 2006). Thus, there is a need for a well groomed entrepreneur worker. It is vividly lamented in numerous parts of the literature that entrepreneurial competencies are fast becoming the critical issues for ascertaining who to engage and who to retain in many job places all over the world (Adeyemo, 2009; Badran, 2007; Grubor, 2013; Morrison & Johnston, 2003).

Indeed, understanding about the prominent significance of entrepreneurial competencies among experts, educationist and managers around the world has prompted to judge potential employees not only by their conventional academic training and expertise rather, along with the degree of entrepreneurial skills acquired during their training (Cooper, Bottomley, & Gordon, 2004; Dollinger, 2003; Isaacs, Visser, Friedrich, & Brijlal, 2007). These researchers gained support from many governments in most Nation of the world, Nigeria inclusive. This assertion has been proved beyond reasonable doubt, for instance the Federal Government of Nigeria (FGN) through the Federal Ministry of Education (FME) has made it mandatory for all tertiary education institutions to include the teaching of Entrepreneurship Education in their instructional curriculum. This development has been incepted at all the Higher Education levels irrespective of the study area and Institutions of learning (Colleges, Polytechnics, Monotechnic, Universities etc.) for students taking Diploma courses, Bachelor Degree courses, Nigeria Certificate of Education courses respectively (Aja-Okorie & Adali, 2013; Odia & Odia, 2013).

However, the fundamental essence of teaching the course is to furnish and guarantee graduates from Nigerian higher education with knowledge of appropriate skills, competencies and disposition that will make them globally competitive and capable of establishing their own businesses so that they will be self employed (NBTE, 2003; NCCE, 2011; NUC, 2002). In fact, such a development was attributed in the United Kingdom as a chance for tertiary education institutions serve the innovation needs of businesses and to produce graduates with transferable skills for businesses (Volkman et al., 2009). No doubt that the key role of entrepreneurship education is for producing entrepreneur. Certainly, an entrepreneur in the society is a factor of production that can make meaningful economic and social contributions. In essence, tertiary institutions that integrate effective entrepreneurial training could perhaps respond to the need of the society.

Interestingly, Science, Technical and Vocational Education (STVE) disciplines are skills oriented fields in nature that provides the much needed skills for employment. Probably, the introduction of entrepreneurial training in many fields, including STVE is to build and expands the employment chances of its recipient particularly in the recent centuries. The prospect of this new orientation envisages who is most liable to undertake

employment either as an employee or in personal business after tertiary education (Inegbenebor, 2007; Volkmann et al., 2009). The relative importance of entrepreneurial skills to STVE students cannot be overemphasized; for instance, it develops and enhances their career success (Jones & English, 2004; Vinten & Alcock, 2004), make them understand the culture and ethics of business practices (Calás, Smircich, & Bourne, 2009; Sud, VanSandt, & Baugous, 2009), puts their initial inspiration and creativity into real life situations (Calás et al., 2009; Morrison & Johnston, 2003; Olagunju, 2004) and consistently serves their economic structures (Acs & Szerb, 2007; Gürol & Atsan, 2006; Windsor, 2009). Based on the basis important of entrepreneurship education to STVE students, it is logical and worthy to mention that embodiment of the entrepreneurial practices into the curriculum of STVE fields provides no transient effects on the technological and economical sustainability of the STVE graduates. Hence efforts for rebuilding this exciting innovation may not be unconnected to the development of the employment sector particularly in this contemporary era.

In fact, entrepreneurial practices in African Nations (Nigeria inclusive) have generally arisen from the interaction of innovative practices that were initiated by educational agencies and nongovernmental agencies. In the early and middle of 90 century, researchers who are miners of entrepreneurs (Educators) have identified entrepreneurial skills as Commitment and Strategic skills (Van der Kuip & Verheul, 2004); Strategic & Organizing skills (Wallace & Hunt, 1996); Opportunity & Perseverance skills (Bartlett & Ghoshal, 1997; Man & Lau, 2000); Organizing & Commitment skills (Bird, 2002); Conceptual & Relationship skills (Man & Lau, 2000; Snell & Lau, 1994); and Organizing & Conceptual skills (Haynes, 2003; Mitchelmore & Rowley, 2010). These skills have been endorsed and researched in numerous literatures as valuable skills for a person to be an entrepreneur.

Recently, there are considerable skills agreed upon by researchers that make someone an entrepreneur and these skills were identified to be learning and teaching dependent through academic experiences (Kuratko, 2005; Matlay, 2008). Four categories of entrepreneurial skills; namely: technical, management, entrepreneurship and personal maturity were considered as priority ingredients for student's entrepreneurship education success in school (Lyons & Lyons, 2002; Smith, Schallenkamp, & Eichholz, 2007). These groups of skills were further categorized down into subdivisions of competencies and recently utilized for assessing students entrepreneurial competencies development (Chang & Rieple, 2013). However, the classifications of these skills are having a close similarity to what is obtainable in the formal STVE in bachelor degree programmes in Nigeria. Acquisition of these skills in the formal STVE programmes is meant to empower the students to reap the dividend of their education.

A substantial body of literatures tends to agree that different learning environment is required to support the study of entrepreneurship education within a university setting. For instance, Gibb (2002), categorically mentioned that a teaching style that is action-oriented, encourages experiential learning, problem solving, project-based learning, creativity, and is supportive of peer evaluation. It is thought that such a process best provides the mix of

enterprising skills and behaviours to those required to create and manage a small business. It has consistently been argued that for developing nations (Nigeria inclusive) to grow and catch up with other developed nations, there is the urgent need for a viable entrepreneurship model that can also promote growth of SMEs, wealth creation, enhance value reorientation, preserve the ecosystem from abuse and in the final analysis achieve sustainable economic development (DFID, 2009; NEEDS, 2004).

## **1.1 Problem Background**

Advancement in the employment sector has impelled entrepreneurs to suggest many skills for becoming a fully entrepreneur and how it should be taught is a matter for debate (Lazear, 2004; Matlay, 2008). This has developed debates among entrepreneurial scholars and writers, the activist of learning-by-doing approach (Business role model) and the supporter of conventional classroom-based discussions approach of hypothetical questions (Politis, 2005; Politis & Gabrielsson, 2009).

However, the supporter of the first debating side were of the opinion that since entrepreneurship education is about new venture creation, students supposed to be taught while undergoing real-life experiences (learning-by-doing) (Cruz, Escudero, Barahona, & Leitao, 2009; Hampden-Turner & Tan, 2002). In the same vein, opponents of classroom-based approach observed that though, it places emphasizes on the three Kolb's categories: observation, forming abstract concept and active experimentation, but is weak in the provision of concrete experiences (Politis & Gabrielsson, 2009). Furthermore, it was asserted that hybrid approaches of learning-by-doing combine conventional instruction with collaboration with real business people may perhaps produce students' entrepreneurial behaviours, mindsets, capabilities and skills to create visionary entrepreneurs particularly in this 21<sup>st</sup> century (Heinonen & Poikkijoki, 2006). These claims have made some reasonable number of entrepreneurship educators in many parts of the world to support this approach of instruction. Hence, this innovation remains out of place specifically, in entrepreneurship education practice in Nigeria.

Alternatively, the proponents of classroom-based-approach for example, has observed that "Learning-by-doing, for its part, is weak in theoretical underpinning" (Richardson & Hynes, 2008). Also adherents of Classroom-based-approach often raised the predicament of cost, physical enabling environment and involvements of experts during entrepreneurial processes as a devastated factor (Gabadeen & Raimi, 2012; Sofoluwe, Shokunbi, Raimi, & Ajewole, 2013). Another concord view reveals that the Classroom-based-approach transforms the worldview of students from work seekers to wealth creators (Garba, 2012; Garba, Mansor, & Djafar, 2013). In another related view, classroom-based-approach involves reading articles and literature supported by group and peer discussion to offer learners' theoretical understandings and introduction to the entrepreneurial phenomenon that gives them the opportunity to broaden their perspectives during peer reflection (Heinonen & Hytti, 2010).

In addition, under the dominance of the learning by doing paradigm, schools teach what and how rather than why on content which is equally important (Kirby, 2006). Other researchers also perceive that the key to entrepreneurship success lies in the acquisition of “knowledge” through accurate representation of teachers. This instructional approach remained the popular practicing entrepreneurship instructional method among teachers in many African Nations including Nigeria. Hence, this study seeks to quantitatively identify the learning outcomes from the conventional teaching approach adopted by entrepreneurship education teachers in Abubakar Tafawa Balewa University Bauchi.

## **2 OBJECTIVES OF THE STUDY**

The paper intends to present an explanatory assessment that examined the academic justification of the inclusion of entrepreneurship education, specifically, on the development of undergraduate students’ entrepreneurial skills over the pedagogical approach adopted by the instructors as outlined in the university curriculum standard. Specifically, the study seeks to:

- (i) Assess how science, technical and vocational education students’ entrepreneurial skills was enhanced based on technical, management, entrepreneurship and personal maturity groups of entrepreneurial skills identified in the literature.
- (ii) Assess if there is different between the entrepreneurial skills of science, technical and vocational education students prior and after of instruction.

## **3 HYPOTHESES**

Three null hypotheses were tested at the 0.05 alpha level; the hypotheses are:

- H<sub>01</sub>:** Entrepreneurial skills’ mean scores of school of technology education students prior and after attending entrepreneurship education course will not differ significantly.
- H<sub>02</sub>:** Science, technical and vocational education students will not significantly differ on entrepreneurial skills prior to attending entrepreneurship education course
- H<sub>03</sub>:** Science, technical and vocational education students will not significantly differ on entrepreneurial skills after attending to entrepreneurship education course

## 4 METHODOLOGY

Quantitative study method was employed for the explanatory case study in ATBU, Bauchi, Bauchi State in North Eastern Sub Region of Nigeria. The population of the study comprised a total of four hundred and fifty two (452) year-three undergraduate students from School of Technology Education. However, the sample size was all the students that registered for the entrepreneurship education course during 2006/2007 and 2007/2008 academic sessions. Thus, three hundred and nine School of Technology education students (Science education =103, vocational =103 and technical =103) were the study sample. Entrepreneurial Skills Development Assessment Questionnaire (ESDAQ) was adapted from (Lyons & Lyons, 2002) and modified to suit this research context. This instrument was adopted partially for the reason of convenience and for its capability to appraise novice entrepreneurs; independent of any level of skill (Smith and Munro 2007 & Lyons and Lyons, 2002).

The instrument evaluates four meta-categories of entrepreneurship education competency areas, viz; technical, management, entrepreneurship, and personal maturity. Twenty competencies in the four entrepreneurial skills were involved as the ESDAQ items. Four points Likert scale on 'Highly possessed' 'Moderately Possessed' 'Low possessed' and 'Not possessed' was used in the ESDAQ. At the beginning and the end of the instruction the students voluntarily assessed them self on the level of entrepreneurial skills possessed. However, the face and content validations of the instrument were further carried out by four experts in entrepreneurship education in the study hosting University. The reliability of the instrument was ascertained using Cronbach's Alpha that produced an internal consistency (reliability coefficient)  $r = 0.80$ .

### 4.1 Description of the Sample

The 309 students comprised the sample and were taught by three lecturers at Abubakar Tafawa Balewa University, from Bauchi State in Nigeria. The distribution of the students according to course of study was equal based on the university admission criterion. The sample comprised of final year students that took the last entrepreneurship education course (Private business management). The purposively selected sample students were from two programme of study: Vocational and technology education programme (TVEP) with 206 students and science education programme (SEP) with 103 students. Those in TVEP specialized in mechanical technology education, construction technology education, electrical electronics technology education, agricultural science education and business education; while those from SEP specialized in biology education, chemistry education, integrated science education, physic education, library and information science education, mathematics education, and computer science education.

Table 1 reveals summary of the purposive sample distribution. All the two programmes that fall into the sample were from the School of Technology Education of the university.

**Table1 Summary of Sample Distribution**

| <b>Student area of study</b> | <b>No of students</b> | <b>Department</b> | <b>Percentage of students</b> |
|------------------------------|-----------------------|-------------------|-------------------------------|
| Science Education            | 103                   | SEP               | 30%                           |
| Technical Education          | 103                   | VTEP              | 20%                           |
| Vocational Education         | 103                   | VTEP              | 15%                           |
| <b>Total</b>                 | <b>309</b>            |                   |                               |

#### **4.2 Reliability Analysis**

By using the sample of students described above, an analysis of internal consistency of the questionnaire items on the entrepreneurial skills provided a Cronbach's alpha coefficient of 0.80. Numerous standard range values for a suitable level of reliability have been recommended, with least limits varying from 0.5 to 0.7 (Neuendorf, 2002, 2011). The ESDAQ was judged to have internal consistency of reliability above the lower limits range recommended by Neuendorf.

### **5 DATA ANALYSIS**

After collection, data was further entered into Statistical package for Social Science (SPSS) for PC Windows and analyzed. The analyzed data was revealed in the form of Mean, Standard Deviation, Analysis of Variance ANOVA and Scheffe's post hoc Analysis.

#### **5.1 Analysis of Results**

The three null hypotheses that guided this study were tested at 0.05 significance level. The analysis of each hypothesis was presented as follows:

### 5.1.1 Hypothesis 1

**H<sub>01</sub>:** Entrepreneurial competencies mean scores of education students prior and after attending entrepreneurship education course will not differ significantly.

**Table 2: t-test Results on the Difference in the Entrepreneurial Skills of STVE Students at the Beginning and After Instruction**

| Entrepreneurial Skills         |                                   | Initial Stage |      |       |      | Final Stage |            |         |
|--------------------------------|-----------------------------------|---------------|------|-------|------|-------------|------------|---------|
|                                |                                   | N=309         |      | N=309 |      | N=309       |            |         |
| S/N                            |                                   | Mean          | SD   | Mean  | SD   | Mean Diff.  | Std. Error | t-value |
| <b>Technical Skills</b>        |                                   |               |      |       |      |             |            |         |
| 1                              | Operational                       | 3.61          | 0.55 | 3.97  | 0.68 | 0.36        | 0.043      | 8.372*  |
| 2                              | Supplies/raw materials            | 3.18          | 0.81 | 3.19  | 0.87 | 0.01        | 0.058      | 0.010** |
| 3                              | Production/Office space           | 3.16          | 0.64 | 3.63  | 0.67 | 0.47        | 0.045      | 0.473** |
| 4                              | Equipment/plant/technology        | 2.95          | 0.85 | 3.28  | 0.99 | 0.33        | 0.064      | 5.156*  |
| <b>Management Skills</b>       |                                   |               |      |       |      |             |            |         |
| 5                              | Management and planning           | 2.21          | 1.15 | 2.32  | 1.05 | 0.11        | 0.076      | 1.447*  |
| 6                              | Organizing and supervising        | 1.88          | 0.79 | 2.14  | 1.01 | 0.26        | 0.062      | 4.193*  |
| 7                              | Marketing/sales                   | 1.52          | 0.85 | 2.97  | 0.97 | 1.45        | 0.063      | 23.01*  |
| 8                              | Financial management              | 2.46          | 0.98 | 2.59  | 0.72 | 0.13        | 0.059      | 16.94*  |
| 9                              | Legal                             | 2.21          | 1.15 | 3.10  | 0.62 | 0.89        | 0.064      | 13.90*  |
| 10                             | Administration                    | 1.74          | 0.70 | 2.21  | 1.15 | 0.47        | 0.066      | 7.121*  |
| 11                             | Higher-order and problem- solving | 1.37          | 0.69 | 2.89  | 0.89 | 1.52        | 0.055      | 27.63*  |
| <b>Entrepreneurship Skills</b> |                                   |               |      |       |      |             |            |         |
| 12                             | Business planning and development | 2.86          | 0.91 | 3.00  | 0.96 | 0.14        | 0.064      | 2.187*  |
| 13                             | Environmental examining           | 1.50          | 0.78 | 3.01  | 0.94 | 1.51        | 0.059      | 25.59*  |
| 14                             | Opportunity identification        | 1.39          | 0.72 | 3.82  | 0.48 | 2.43        | 0.042      | 57.85*  |
| 15                             | Advisory board and network        | 1.52          | 0.85 | 2.98  | 0.94 | 1.46        | 0.062      | 23.54*  |
| <b>Personal Maturity</b>       |                                   |               |      |       |      |             |            |         |
| 16                             | Self-awareness                    | 2.46          | 0.98 | 2.95  | 0.85 | 0.49        | 0.063      | 7.778*  |
| 17                             | Accountability                    | 1.30          | 0.59 | 3.87  | 0.45 | 2.57        | 0.036      | 71.39*  |
| 18                             | Emotional coping                  | 2.95          | 0.85 | 3.12  | 0.52 | 0.17        | 0.049      | 3.470*  |
| 19                             | Creativeness                      | 3.00          | 0.76 | 3.14  | 0.54 | 0.14        | 0.045      | 3.111*  |

NOTES: \* Significant at 0.05 level; N = 309; df = 308.

\*\*Not Significant at 0.05 level; N = 309; df = 308

Table 2 disclosed the analysis summary of significant difference between entrepreneurial skills of the students prior and after instruction using t-test analysis. The t-test decision criteria were for all the sub-skills under the technical, management, entrepreneurship and personal maturity. When the t-test calculated value ( $t_{Cal}$ ) is less than the t-test table value ( $t_{Tab}$ ) it means the null hypothesis can be rejected. On the other hand, if the



$t_{Cal}$  value is greater than  $t_{Tab}$  value it implies that the null hypothesis can be accepted. Although, the analysis was conducted using Statistical Package for Social Sciences (SPSS).

Based on this decision criteria, significance differences were observed in all the competencies in the Management Skills, Entrepreneurship Skills and Personal Maturity skills. This was because all the calculated  $t_{Cal}$  values were less than the  $t_{Tab}$  values. On the other hand, Operational and Equipment/plant/technology competencies in the technical skills area were significant because their  $t_{Cal}$  values are less than the  $t_{Tab}$ ; Besides Supplies/raw materials and Production/Office space in the Technical skills was identified as not significant with their  $t_{Cal}$  values greater than the  $t_{Tab}$ .

### 5.1.2 Hypothesis 2

**H<sub>03</sub>:** Science, technical and vocational education students will not significantly differ on entrepreneurial competencies prior to attending entrepreneurship education course.

**Table 3: ANOVA Results of Entrepreneurial Skills for STVE Students Prior EEC**

| Source of Variation | Sum of Squares | df  | Mean Square | F    | p   | Decision |
|---------------------|----------------|-----|-------------|------|-----|----------|
| Between Groups      | 1.659          | 2   | .830        | 3.32 | .34 | Accept   |
| Within Groups       | 76.169         | 306 | .250        |      |     |          |
| Total               | 77.828         | 308 |             |      |     |          |

Table 3 disclosed the summary of Analysis of variance (ANOVA) that reveals the level difference between entrepreneurial skills of STVE students prior to entrepreneurship education. Significant alpha value decision rule was used. According to this rule, any computed alpha value greater than alpha value (0.05) indicates that the result is not statistically significant. On the other hand, if the computed alpha value is less than the alpha value (0.05), it implies that the result is statistically significant.

Based on the decision rule, the result of the analysis shows in Table 3 indicates that the entrepreneurial skills of STVE students do not statistically differ significantly. Hence, the null hypothesis 2 was accepted. This implies that *STVE students do not significantly differ in their entrepreneurial skills perception prior to attending entrepreneurship education course (EEC)*. This is because the exact significance level (0.34) provided in the SPSS result is greater than the alpha value (0.05).

### 5.1.3 Hypothesis 3

**H<sub>03</sub>:** Science, technical and vocational education students will not be significantly different on entrepreneurial competencies after attending to entrepreneurship education course.

**Table 4: ANOVA Results of Entrepreneurial Skills for STVE Students after EEC**

| Source of Variation | Sum of Squares | df  | Mean Square | F     | p    | Decision     |
|---------------------|----------------|-----|-------------|-------|------|--------------|
| Between Groups      | 21.685         | 2   | 10.843      |       |      |              |
| Within Groups       | 121.847        | 306 | .399        | 27.14 | .000 | Not Accepted |
| Total               | 143.532        | 308 |             |       |      |              |

Table 4 revealed the summary of Analysis of variance (ANOVA) that presents the level of difference between the perception entrepreneurial skills of STVE students after attending to entrepreneurship education course. Significant alpha value decision rule was used. According to this rule, any computed alpha value greater than alpha value (0.05) indicates that the result is not statistically significant. On the other hand, if the computed alpha value is less than the alpha value (0.05), it implies that the result is statistically significant.

Based on the decision rule, the result of the analysis shows in Table 4 indicates that the entrepreneurial skills of STVE students have statistically differ significantly. Hence, the null hypothesis 3 was not accepted. This implies that *STVE students' entrepreneurial skills after attending to EEC is significantly different*. This is because the exact significance level (0.00) provided in the SPSS result is less than the alpha value (0.05).

### 5.1.4 Scheffe Post Hoc Analyses

From Table 3 there was model statistically significant for the ANOVA,  $F(2,306) = 27.141, p < .05$ , revealing that at least one significant difference between the means. Furthermore, the Scheffé post hoc test needs to be conducted to determine where specifically the statistical difference exists. To effectively carry out this, sub-hypothetical statements in line to H<sub>03</sub> were realized as follows:

**H<sub>03a</sub>:** Science and technical education students will not be significantly different on entrepreneurial skills after attending entrepreneurship education course

**H<sub>03b</sub>:** Vocational and Science education students will not be significantly different on entrepreneurial skills after attending entrepreneurship education course

**H<sub>03c</sub>:** Technical and vocational education students will not be significantly different on entrepreneurial skills after attending entrepreneurship education course

**Table 5: Scheffe ' s Post Hoc Analysis of Pairs Comparisons for Entrepreneurial Skills of STVE Students**

| Student (I) | Student (J) | Mean Difference (I-J) | Std. Error | p    | 95% Confidence Interval |             |
|-------------|-------------|-----------------------|------------|------|-------------------------|-------------|
|             |             |                       |            |      | Lower Bound             | Upper Bound |
| Science     | Technical   | -.68448*              | .10456     | .000 | -.9417                  | -.4273      |
|             | Vocational  | -.12413               | .09141     | .399 | -.3490                  | .1007       |
| Technical   | Science     | .68448*               | .10456     | .000 | .4273                   | .9417       |
|             | Vocational  | .56034*               | .08682     | .000 | .3468                   | .7739       |
| Vocational  | Science     | .12413                | .09141     | .399 | -.1007                  | .3490       |
|             | Technical   | -.56034*              | .08682     | .000 | -.7739                  | -.3468      |

\*. The mean difference is significant at 0.05 level.

**H<sub>03a</sub>:** Science and technical education students will not be significantly different on entrepreneurial competencies after attending entrepreneurship education course

Scheffé post hoc comparisons showed that entrepreneurial skills of technical education students were statistically significant when compared to the science education option,  $P < .00$  (two-tailed). Besides, the mean disparity of the two sets in two statistical occasions was .68 and -.68 respectively. This discloses that the difference is not by chance. Thus, the sub-null hypothesis that *science and technical education students will not be significantly different on entrepreneurial skills after attending an entrepreneurship education course* was considered not accepted.

**H<sub>03b</sub>:** Vocational and Science education students will not be significantly different on entrepreneurial competencies after attending entrepreneurship education course

The result of the Scheffé post hoc comparisons shows that entrepreneurial skill difference of vocational education students was not statistically significant when compared to

those in science education option,  $P < .40$  (two-tailed). In addition, the mean difference of the two groups for two occasions was .12 and - .12 respectively. This shows that the difference is by chance. As a result, the sub-null hypothesis that *vocational and science education students will not significantly differ on entrepreneurial skills after attending an entrepreneurship education course* was accepted

**H<sub>03c</sub>:** Technical and vocational education students will not significantly differ on entrepreneurial skills after attending entrepreneurship education course

From the analysis of the Scheffé post hoc comparisons illustrate that entrepreneurial skill difference of Technical education students was statistically significant when compared with those in vocational education option,  $p < .00$  (two-tailed). In addition, the mean difference between the two groups in two occasions was .56 and -.56 respectively. This shows that the difference is not by chance. Therefore, the sub-null hypothesis that *technical and vocational education students will not significantly differ on entrepreneurial skills after attending an entrepreneurship education course* was deemed as not accepted.

## 6 DISCUSSIONS

*Entrepreneurial skills mean scores of education students prior to attending and after an entrepreneurship education course will not differ significantly, Science, technical and vocational education students will not significantly differ on entrepreneurial skills prior to attending entrepreneurship education course and Science, technical and vocational education students will not significantly differ on entrepreneurial skills after attending to entrepreneurship education course.* Those were the hypotheses that guided the analysis of the data collected during the conduct of the Entrepreneurship Education Teaching of this study. STVE students' entrepreneurial skills prior to the conduct of EEC and after were sought and measured, especially when the adapted-modified research instrument was developed (and validate) to evaluate the most important entrepreneurship education learning outcomes for students in STVE in the University.

Table 1 reveals the result of the first hypothesis. It was remarkably ascertained that for roughly all the items measured, there was an observable number of students who indicates the higher possession of entrepreneurial skills at the end of the EEC, but selected lower possession responses prior to commencing of the EEC. The t-test result was conducted in sixteen competency areas of the four aspects of entrepreneurial skills. The *t*-test result of the technical skills aspect shows significant difference in the operational, and equipment/plant/ technology competencies,  $t$ -value = 8.37, 5.15 and no significant difference was found in the supplies/raw material and production/office space,  $t$ -value = 0.01, 0.47. This result has matched with the finding that reveals career education students that receive an entrepreneurship training usually improves on diverse technical skill areas, although not

necessarily excellent at all the occupational specific skill areas (Baum & Locke, 2004; Lazear, 2004).

The *t*-test statistic on management skills shows that there was significant differences in all the seven areas of management skills, in the competency areas of Management and planning, organizing and supervising, marketing/sales, financial management, legal, administrative and higher-order and problem-solving with a corresponding *t*-value of 1.45, 4.19, 23.01, 16.94, 13.90, 7.12 and 27.63 respectively. In a study that testified that the development of farmer entrepreneurial skills development involves changes of management capabilities in the process of farming that include the sales/marketing knowledge, planning, organization, supervision supports (Austin, Stevenson, & Wei-Skillern, 2006; Kirby, 2004, 2006; McElwee, 2006), this has consistently agreed with this finding. On the other competency areas, In a study of career and technical students in Finland, found remarkable improvement in Legal, Organizing, supervising and Higher-order and problem-solving competencies (Oosterbeek, van Praag, & Ijsselstein, 2010).

Result in the four entrepreneurship skill areas: Business planning and development, Environmental examining, Opportunity identification, and Advisory board and network competencies have *t*-test values of 2.19, 25.59, 57.85, and 23.54 respectively. Measurement in these areas indicates that the STVE students acquired these competencies significantly as a result of the EEC received. Results from another study also show that individuals' competencies and procedures for opportunity identification and business location selection proficiencies have improved significantly after entrepreneurship in-class instruction (DeTienne & Chandler, 2004; McMullen & Shepherd, 2006). Whereas, result on advisory boards and network familiarity has contravene found that stated that student confidence has not improved significantly (Chang & Rieple, 2013).

Personal Maturity skills that comprised competencies of Self-awareness, Accountability, Emotional coping and Creativeness differ significantly with *t*-values of 7.78, 71.39, 3.47 and 3.11. This shows that the students have benefited significantly in all the areas of personal maturity skills after the EEC sessions conducted at the university. This result corroborated the similar finding that declares significant improvement in each area of personal maturity investigated in a longitudinal study of engineering student that carry out a traineeship (Smith, Henry, & Munro, 2002; Smith et al., 2007).

The hypothesis tested on the entrepreneurial skill difference amongst the STVE students prior to EEC reveals no significant difference. This result indicates that the students have no considerable variation in the level of their entrepreneurial skills. The slight variation in the mean could be just by chance. Similar to this finding, difference in science and engineering students' entrepreneurial behaviours was tested prior to attending entrepreneurship programme and it was discovered to have no significant difference (Souitaris, Zerbinati, & Al-Laham, 2007). Also In an entrepreneurship development program, community college student and their counterpart, high school student show no significant

variation in their entrepreneurial skills prior to attending a national school-based entrepreneurship school training (Chisholm Hanham, Loveridge, & Richardson, 1999).

A significant difference was found in the entrepreneurial skills amongst technical and Science education as well as amongst technical and vocational education students. However, there was no significant difference between the entrepreneurial skills of science and vocational education students. This shows that there was considerable difference between only two paired groups of students. Similar study reveals that, when different groups of student were exposed to entrepreneurship education and training in Turkish university a significant difference was also observed (Gürol & Atsan, 2006). In another related development, students in two different locations, but similar entrepreneurship training, the results also disclosed significant difference in their entrepreneurial capabilities (Lee, Chang, & Lim, 2005).

## **7 CONCLUSION**

The contribution of entrepreneurship education at undergraduate level was investigated. The study reveals that the undergraduate entrepreneurship education course indeed contributed toward enhancing the entrepreneurial skills of undergraduate science, technical and vocational education. It was also found that the entrepreneurial skills of technical education students are significantly higher than that of their counterparts in the science and vocational education programs, which could be due to their higher technical skills compared to those in science and vocational education.

## **8 RECOMMENDATIONS**

Based on the abovementioned reasons, the study recommends for the following suggestions:

- (i) Teachers of respective departments should give emphasis to technical skills during their training.
- (ii) Entrepreneurship education course teachers should diversify use of teaching methods specifically those that emphasize learning-by-doing approach.
- (iii) A balanced strategy should be adopted in the entrepreneurship education course curriculum by given equal consideration to all the entrepreneurial skills that deemed relevant.

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