

Entrepreneurial Skills Enhancement among Bachelor of Education Science Students Through Entrepreneurship Training

IBUATHU C. NJATI*, Omae, H.N.

P.O BOX 972-60200 MERU

P.O BOX 972-60200 MERU

School of Education, Meru University of Science & Technology

Abstract: *The paper examines the utility of entrepreneurship training programme towards enhancing entrepreneurial skills of bachelor of education science students. The study answered the following expected research hypotheses: H_{01} : the science teacher trainee would not significantly improve instructional skills when subjected to entrepreneurship training; H_{02} : entrepreneurship training of science teacher trainee would not significantly enhance their creativity skills in developing teaching models; H_{03} : entrepreneurship training would not significantly influence science teacher trainee's views on value addition of available materials within their environment for education use. The study was guided by theory of planned behaviour and human capital theory and worked with a total sample of 120 respondents drawn from Bachelor of education science third and fourth year students at Meru University of Science and technology. The study employed questionnaires, interview schedules, t-test and ANOVA in testing the hypotheses under experimental research design. The findings showed that bachelor of education science trainees' participation in entrepreneurship training: boasted their pedagogical delivery at classroom level; would improve their creativity in making models for teaching and learning significantly, and could significantly influence their prudent running of school by ensuring adequate utilisation of available resources including recycling and values addition. The study concluded that teaching entrepreneurship education to bachelor of education science would really improve both their teaching techniques and administrative skills. Therefore, the study recommended that bachelor of education science students methodologies of training be expanded and blended with entrepreneurship education besides conventional approaches of training.*

Keywords: *Science education, Entrepreneurship education, Training approaches, Teaching skills and innovations*

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I. Introduction

Today, the necessities in any given vocation are continuously and fast changing due to technological and entrepreneurial innovations. This has resulted to adoption of innovative measures and enormity of job skills for prospective employees in a firm. Thus, today's workplaces including school organisations require a well-trained and competent teacher with proficiency in entrepreneurial skills for the fast changing teaching environment (Koppensteiner, 2017; Ruskovaara & Pihkala 2015). This thinking calls for well trained teachers with entrepreneurship competencies.

Entrepreneurship education and learners' stimulating techniques have gained attention and have been extensively studied world over (Bliemel 2014; Ahmad, A. D., Abdulkarim, A.D., Andi, M. M. J. K, & Abubakar, M. H., 2014). Mostly, of the methods practiced teach only about project establishment and running of business undertakings instead of training in education entrepreneurship competencies. The teacher trainees once in a while could be accorded a chance to apply the concrete aptitude they would need as educational entrepreneurs and hardly concentrate on improving learners' skills, aptitude and behaviour (Mwasalwiba, 2010 and Austria 2017). It is observed that teacher trainees are hardly provided with choices to conduct their entrepreneurship education. Jones and Iredale (2010) and EU (2018) observe that at least two changes are required for entrepreneurship education objectives to be met: curricula must be changed and teaching and learning methods developed. On the other hand, several studies have documented entrepreneurship education from a broader point of view and claim that it should contribute towards stimulating abilities such as flexibility, imagination, resourcefulness, creativity and a tendency to think theoretically (Byabashaija and Katono 2011; Koppensteiner 2017 and EU 2018). Surveys carried out in Europe in recent years, showed that most higher education students agreed that training programmes should comprise general competences such as communication skills, teamwork, and learning to learn; besides, entrepreneurship education aptitudes should

include diverse projects carried out by learners, under the facilitation of a teacher rather than a controlling instructor (Koppensteiner, 2017).

Viewed differently, the teaching and developing of technology education aptitudes and competencies in various professional specialisations must build much needed proficiency for employment. Perhaps, the introduction of entrepreneurship as a main learning discipline in education could increase the absorption of beneficiaries of the system into the present world of business in both service and manufacturing industry. The prospects of this new course predict employees who are versatile in the in the field of work. (Volkman et al., 2009 and EU 2018). While teaching and training of technical and vocational education teachers embraces some entrepreneurship skills, training of science teachers in many institutions of higher learning has continued with little or no entrepreneurship courses at all. This is demonstrated by courses of study offered to bachelor of education science teacher trainees in many institutions of higher learning in many countries all over the world (EU 2018).

At tertiary stages of training, the objects of of entrepreneurial training are to build up aptitudes and competencies of learners. Thus entrepreneurial training programs should have expected learning outcomes that are more focused to specific competencies. For example; inculcating learners awareness and motivation, equipping learners with requisite skills for initiating a project and overseeing it full implementation. ; building learners entrepreneurial capacity to recognise available openings within their environment and utilise them. It is noteworthy that the many teacher training curricula at university's level have not integrated entrepreneurship as a component of training competency. However, various research findings show that in many institutions of higher learning entrepreneurship is taught to trainees pursuing various business related courses (EU 2018). However, literature about entrepreneurship training among science teachers in Africa and Kenya in particular is scarce.

Present education systems in most developing countries are primarily based on spoken/linguistic and rational/ mathematical intelligences, consequently they focus mainly on the functions of the left brain. Oral/linguistic intelligence is the sensitivity to spoken and written language, the ability to learn specific disciplines, and the capacity to use language to accomplish certain goals. (Altan, 2014 and Gardner, 1999). Thus, present education systems force all individuals to put on the same dimensions and do not assist them to question, think critically, be creative, take risks whenever necessary by developing entrepreneurial attitude thereby becoming an entrepreneur (Altan, 2014).

Based on study findings since 2000, the international development goals have pushed for increased educational access commonly measured by school enrollment for children. In 2015, the Sustainable Development Goals (SDGs) redirected the narrative on education from accessibility to learning. In this respect, teachers are expected to drive quality education (AAS, 2018). Recognizing their importance, the SDGs make a unique indicator for measuring and following keenly the supply of trained and qualified teachers pursuant to vision 2030. In the last two decades much of governments' investment has been directed towards realizing educational access by all children of school going age (Ibid). Therefore, scanty evidence exists to realize how countries are performing on the indicators of teacher training especially on entrepreneurship competences. Studies by QAA (2018) and Department for Education (2017) document that developing an entrepreneurial way of thinking in any discipline is becoming: self-aware of individuality and social identity. In this connection, by exposing a teacher trainee to hands-on experiences the learner is likely to engage into entrepreneurial actions leading to specific judgments sufficient for a teacher trainee to exhibit unique skills for decision making and self-sufficiency. Specifically, these are some of the parameters the study sought to evaluate.

II. Theoretical Underpinnings

Human capital theory

The human capital theory has been described by Thomas et al (2013) as *people, their performance and their potential in the organisation*. Thus, this definition significantly highlights that individuals can add to their knowledge base through learning. Therefore, in a knowledge economy, it is the non tangible abilities and skillfulness of the workforce and the firm's intellectual capital within the organisation's structures, routines, systems and processes which can contribute towards the knowledge capital of the organisation (Grant 1996a, Mahoney and Kor 2015). Consequently, training science teachers in entrepreneurship skills would in return instill into them judgement competencies, development of specific skills leading to decision making and distinct teaching and learning competences required in teaching precise aptitudes to secondary school learners thereby transforming our society.

Theory of planned behaviour

The theory conceives that individual behavior is driven by behavior intentions, where behavior intentions are a function of three determinants: first is one's approach toward actions; secondly, a person's prejudices or biases and thirdly an individual's, distinguished observable character organisation. Thus, people

should make decisions based on the right judgement, unique skills; and other bodily factors necessary to execute an action besides overcoming external factors (Ajzen, 1991).

Therefore when science teacher trainees are exposed to entrepreneurship training are most likely to engage into innovative ways of improving teaching delivery at classroom level.

Problem Statement

While teaching and training of technical and vocational education teachers embraces some entrepreneurship skills, training of science teachers in many institutions of higher learning has continued with little or no entrepreneurship courses at all. This is demonstrated by courses of study offered to bachelor of education science teacher trainees in many institutions of higher learning in many countries all over the world (EU 2018). However, in 2015, the Sustainable Development Goals (SDGs) redirected the narrative on education from accessibility to learning; where teachers are key drivers to quality of education. In this respect the SDGs make a unique indicator for measuring and tracking keenly the supply of trained and qualified teachers pursuant to vision 2030 (AAS, 2018). In the last two decades much of governments' investment has been directed towards realizing educational access by all children of school going age (Ibid). Therefore, scanty evidence exists to realize how countries are performing on the indicators of teacher training especially on entrepreneurship competences.

Study expected outcomes

The study objectives were to:

1. measure level of improvement of science teacher trainee's instructional skills when subjected to entrepreneurship training;
2. determine the creativity skills for developing teaching models in science teachers after undergoing entrepreneurship training;
3. establish science teacher trainee's views on entrepreneurship training value addition on available materials within their environment for education use.

The study hypotheses

The study answered the following expected null research hypotheses about entrepreneurship training of bachelor of education science students:

1. H_{01} : the science teacher trainee would not significantly improve instructional skills after undergoing entrepreneurship training;
2. H_{02} : entrepreneurship training of science teacher trainee would not significantly enhance their creativity skills in developing teaching models;
3. H_{03} : entrepreneurship training would not significantly affect science teacher trainee's views on value addition on available teaching materials.

III. Methodology

The study embraced experimental research design where 55 third and 53 fourth years preservice bachelor of education teacher trainees in mathematics/physics at Meru University of Science & Technology were taught selected topics in entrepreneurial course full and half cycle respectively for two weeks. Thereafter, all trainees in their subject clusters were engaged in one hour tests that sought application of entrepreneurship knowledge in teaching of science at secondary schools/colleges. After the test, the students were required to respond to questionnaires and interview schedules about entrepreneurship skills as components of teaching. The experiment was repeated after 21 days. The results of test and retests were scored and analyzed using t-tests measures, while the questionnaire data was analyzed using ANOVA. The interview schedule information was used to reinforce the questionnaire data.

IV. Findings And Discussions

The entrepreneurial process is the foundation of adding up of value to an item or service above what is presented at that moment in order to increase its efficiency or output. This process could occur in social, environmental, political, technological, economic or legal settings. These could be used to populate the opportunities and threats in preparing teachers in entrepreneurial education. However, entrepreneurial process is underpinned on a frame of three main competency areas that constitute the working mindset. The first competency is judgment. Kirzner (1997) refers to "pure entrepreneurial judgment" as the early detection of opportunities in training where the trainee needs are constantly changing. Right verdicts and the imaginative work outs that lead to significance creation are preceded by the second competency referred to as specific facts and unique skills. As Hmieleski and Baron (2009) affirm, entrepreneurial activity is premised on the entrepreneur's know-how with a group of clients in a given context.

The third competency is decision-making. This meta-competence relates to coping with uncertainty, ambiguity and risk and having enough resilience to learn from experimentation through trial and error.

This could be achieved within working environment and significantly increase establishments rates of desired nature. Thus, entrepreneurs should be open minded, courageously marshal and motivate peers to come up with resources in order to make a move. (Bacigalupo et al. 2016).

1. Hypothesis: **H₀₁**: The science teacher trainee would not significantly improve instructional skills after undergoing entrepreneurship training.

Table 1 presents t-test results of the science teacher trainees’ instructional competencies upon receiving initial and final entrepreneurial training.

Table 1: Science teacher trainee competencies on instructional skills after undergoing entrepreneurship training

Competencies	Initial Training		Final Training				
	N= 108		N=108		Mean Diff.	Std. error.	t-value
	Mean	SD	Mean	SD			
Entrepreneurship Skills							
Confidence	2.87	0.91	3.01	0.96	0.14	0.064	2.186*
vision	1.35	0.72	3.78	0.48	2.43	0.042	57.86*
Motivation	1.52	0.85	2.98	0.94	1.46	0.062	23.55*
Risk-taking	1.40	0.72	3.83	0.48	2.43	0.042	57.86*
Organization strategies	2.48	0.98	2.97	0.85	0.49	0.064	7.777*
Instructional skills							
Classroom management and planning	2.20	1.15	2.32	1.05	0.12	0.076	1.446*
Lesson organizing and supervising	1.89	0.79	2.16	1.02	0.27	0.062	4.191*
problem- solving techniques	1.40	0.70	2.92	0.89	1.52	0.055	27.62*
Addressing learning difficulties	2.97	0.85	3.13	0.52	0.18	0.047	3.469*
Creativity in delivering content matter	3.02	0.76	3.15	0.54	0.13	0.046	3.112*

NOTES: * Significant at 0.05 level; N = 108; df = 107.

Table 1 shows the analyzed summary of science teacher trainees’ instructional competencies after initial and final training on instructional delivery at classroom using t-test analysis. The t-test effects are subject of examined requisite entrepreneurial skills offered and instructional skills taught during training. Thus, when a calculated t-test value compares less to table t-test value, it means discarding the null hypothesis, otherwise when the results are in the contrary, the null hypothesis is upheld. Therefore based on these principles, substantial differences were exhibited in all the experimented aptitudes in the entrepreneurial and instructional skills. This was supported by the fact that all the computed t-test values compared less to the table t-values. It was also observed that all teacher trainees had acquired substantial entrepreneurial aptitudes by the closing stages of the final entrepreneurial training. The t-test exercise was carried out in five areas each of entrepreneurial proficiency and instructional skills respectively. The results show a significant difference in confidence and vision creation competencies with t-values of 2.18 and 57.8 respectively after training teacher trainee in entrepreneurship skills.

In reinforcing these findings, Nwoye (2012) and (Bacigalupo et al. 2016) in their studies concluded that high school physics students had low entrepreneurial characteristics, and that the physics curriculum lacked the resources for the introduction of entrepreneurial characteristics. The same studies concluded that entrepreneurship education presents an innovative learning field for science lessons.

In the same measure, the t-test results indicate that trainees exhibited significant results in motivation and risk taking competencies at classroom level after training in entrepreneurial skills. In connection to these findings, Amos and Onifade (2013) established that science teacher trainees under preserve training perceived entrepreneurship education more positively compared to those trainees taking other disciplines. This could be an eye opener to introducing entrepreneurship training as a professional course into science teachers’ curricula.

On the other hand, the teacher trainee in mathematics and physics specialisations portrayed a positive significance difference in classroom management and planning and lesson organizing and supervising with t-test values of 1.44 and 4.19 respectively. This indicated that the trainee’s competencies of delivering a lesson to learners had improved. In concurrence to these findings, Bacanak (2013) and Ísa and Jaana (2018) observed that science teachers opined that student-centred methods and techniques could be effective in entrepreneurship education within the scope of science lessons. Furthermore, the problem- solving techniques and creativity in delivering content matter had significant effect with t-test value of 27.6 and 3.11 respectively. Moreover, addressing learner’s learning difficulties was significant after entrepreneurial training with a t-test value of 3.46. This indicated that, the teacher trainee’s competencies in addressing creativity in lesson delivery and handling of learner’s areas of learning strains were improved.

In this regard, the findings concurred with studies by Muhammad and Iqbal (2015) who observed that pragmatic approach should be utilized in teaching entrepreneurship. In this way students learn by doing. They learn by interacting with society and societal problems. In concurrence, John Dewey propagated the tenets of pragmatic philosophy of teaching in education. Teachers must embrace teaching entrepreneurship in science education programs through hands-on. Therefore, a teacher acts as a moderator and guide in this approach and learners learn by doing things with their experiences.

2. Hypothesis: **H₀₂**: Entrepreneurship training of science teacher trainee would not significantly enhance their creativity skills in developing teaching models;

Table 2: ANOVA results for entrepreneurial training on enhancement of creativity skills of a teacher trainee

Source of deviation	Sums of Squares	df	Mean Square	F	p	Outcome
Between Groups	28.0	4	7.100	4.057	.000	Annulled
Within Groups	35.0	20	1.750			
Total	63.0	24				

Results from ANOVA table 2 show that $p > 0.05$ hence discarding the stated null hypothesis (H_{02}) since any calculated alpha value ($F = 4.067$) $>$ ($F = 2.870$); hence the observed findings are statistically significant. Therefore, it could be concluded that entrepreneurship training of science teacher trainee would significantly enhance their creativity skills in developing teaching models. However, the entrepreneurship training should be hands-on where the teacher is the facilitator and the student does much of the learning works. These observations were supported by Ahmad et al (2014) and CBI (2017) who documented that after several students doing bachelor's degrees were placed under entrepreneurial training in a university setup a noteworthy disparity was observed from among their inventiveness aptitudes.

3. Hypothesis: **H₀₃**: Entrepreneurship training would not significantly influence science teacher trainee's views on value addition of available materials within their environment for education use.

Table 3.0 ANOVA Results for entrepreneurship training influence on science teacher trainee's views on positive net value that could be added on available instructional materials within their environment

Source of deviation	Sums of Squares	df	Mean Square	F	p	Outcome
Between Groups	15.0	5	3.000	2.727	.000	Annulled
Within Groups	33.0	30	1.100			
Total	48	35				

Table 3 is a summary of ANOVA results presenting the situation on the tested awareness that entrepreneurial aptitude of value addition in training materials by science teacher trainee subsequent to receiving entrepreneurial instructions are achievable or not.

Based on significant alpha value decision, the computed value ($F = 2.727$) at ($p > 0.05$) is greater than table value ($F = 2.530$) hence, the null hypothesis is annulled. That means entrepreneurship training would significantly influence science teacher trainee's views to improve the value of available materials within their teaching environment for education use. Moreover, entrepreneurship education can be entrenched as a straight approach throughout the whole teacher study programme, by viewing it as a key competence important to any teachers' qualifications rather than as an isolated subject.

The study findings are supported by Isa and Jaana (2018) who in their studies concluded that science teachers perceived integration of entrepreneurial component into their professional training with affirmation. The studies documented that science teachers think that student-centred learning and training approaches could be helpful in advancing entrepreneurial schooling within the scope of respective knowledge areas.

Besides, further research observations show that preservice teacher training programs experience affirmative influence from entrepreneurial training.

For instance, preservice teachers acquire qualifications such as judgement, unique skills, innovativeness, confidence, profession and leadership.

Furthermore, the findings concur with (Oplatka, 2014) conclusions on teacher's innovative ideas, experimental and conceptual works to enable incorporation of entrepreneurship lessons for teacher training. These entrepreneurship infusions enable teachers focus on providing self-efficacy and attitude during instructional activities.

V. Conclusions

The involvement of training entrepreneurial aptitudes to selected Bachelor of Science teachers was investigated. The study found out that training entrepreneurial aptitude to teachers contributes to improving their competencies in judgement, unique skills and decision making during teaching learning processes. Moreover, it

was evident that entrepreneurship training would significantly influence science teacher trainee's views on value addition of available materials within their teaching environment for education use. Furthermore, entrepreneurship training of science teacher trainee would significantly enhance their creativity skills in developing teaching models. However, the entrepreneurship training should be hands-on where the teacher is the facilitator and the student does much of the learning works. Finally the results revealed that all teacher trainees had acquired substantial entrepreneurial skills at the end of the final stages of entrepreneurial training such as enhanced creativity in delivering lesson content, personal confidence, risk taking, problem solving techniques and addressing learner's learning difficulties.

WAY FORWARD

Following these findings, the study puts forward the following recommendations:

- i. Teacher trainers of respective science departments should emphasize innovative skills during their trainings by providing their teacher trainee with more hand-on works.
- ii. Teacher trainees should be exposed to more of entrepreneurship education course by exploring areas of difficulties experienced by science students at secondary school and college levels.
- iii. Based on the global shift towards competency based curriculum at all levels of education, entrepreneurship education with a practical approach should be given a niche in teacher training curriculum.
- iv. Teacher training institutions could develop teacher training policy for teacher training on entrepreneurship education. This could be piloted in specific programmes and emerging good practices should be shared amongst teacher educators to eventually become embedded in day-to-day pedagogy curriculum.

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