

[DOI: 10.20472/TEC.2019.007.012](https://doi.org/10.20472/TEC.2019.007.012)

CHINWE NJELITA

NWAFOR ORIZU COLLEGE OF EDUCATION, NSUGBE, P.M.B 1734 ONITSHA, ANAMBRA STATE, NIGERIA, Nigeria

EFFECT OF ACTIVE LEARNING INSTRUCTIONAL STRATEGIES ON PRE-SERVICE CHEMISTRY TEACHERS ACQUISITION OF ENTREPRENEURIAL SKILLS

Abstract:

This study investigated the effect of active learning instructional strategies (ALIS) on pre-service chemistry teacher's acquisition of entrepreneurial skills. The study adopted quasi-experimental design – pre-test, post-test non-equivalent control group. The study was conducted in two colleges of education in the south-east geo-political zone of Nigeria. Purposive sampling was used based on proximity and class size using intact classes guide. Out of these two institutions selected, the pre-service chemistry teachers in one college of education were exposed to ALIS involving field trip, demonstration followed by projects as experimental group while the other institution served as control group exposed to conventional lecture method. One hundred and twenty (120) pre-service chemistry teachers were used for the study. Test on entrepreneurial skills acquisition (TOESA) developed by the researcher served as instrument for data collection. The face and content validity of the instrument were determined using two chemistry educators and specialist in education psychologist from researcher's institution. The reliability of the instrument was established using Kuder-Richardson formula – 21 which was established as 0.89. Mean and standard deviation were used to test the research questions. The hypotheses were tested at 0.05 level of significance using the Analysis of covariance (ANCOVA) statistics. The result of the study revealed that the selected ALIS enhance entrepreneurial skills acquisition amongst pre-service chemistry teachers. It also revealed that there is a statistical difference between the mean skill score of male and female pre-service chemistry teachers taught with selected ALIS and it is in favour of male pre-service chemistry teachers. Based on these findings, it was recommended that chemistry educators should apply the use of selected ALIS namely field trip, demonstration and projects strategies in their classroom instructions.

Keywords:

Active Learning Instructional Strategies, Pre-service Chemistry Teachers, Acquisition, Entrepreneurial Skills, Chemistry.

Introduction

Equipping pre-service chemistry teachers with appropriate instructional strategies that can engender entrepreneurial skills acquisition have been advocated for by researchers such as Agommuoh (2018), Adeyemo (2009). Many instructional strategies have been suggested as being effective for entrepreneurial skill acquisition. They include inquiry approach, guided discovery, demonstration with projects, (Ezenduka and Achufusi, 2016), active learning instructional strategies (ALIS) (Egolum and Njelita, 2015) and so on. There are many strategies embedded in active learning instructional strategies that could be used in chemistry classroom. They include games, field trip, role playing, drama, project, demonstration, discovery, process based, brain-storming, problem solving and so on. To apply these strategies, there is need for skill acquisition.

Skill is the ability to perform some tasks credibly. Skill is acquired particularly in a classroom situation. It is characterized with speed and accuracy as some of its traits and characteristics. It is practical oriented hence the need for entrepreneurial skills. Entrepreneurial skill acquisition could be achieved through Chemistry education.

Chemistry is the branch of Science concerned with the study of matter, its properties and uses. Chemistry has contributed immensely towards providing man's basic needs and improving the quality of life. For instance the manufacture of fertilizer and pesticides has improved food production. To a large extent the services of chemists are essential in the quality control of drugs manufactured in industries as a way of controlling adulteration of drugs in Nigeria (Njelita 2005). Again scientific and technological fields such as medicine, biochemistry, engineering, microbiology and so on have chemistry built in them (Attah & Njoku, 2018).

The objectives of chemistry programme in a tertiary institution such as colleges of education where graduating students obtain National Certificate in Education are to produce highly qualified middle level manpower knowledgeable in the processes of chemistry and capable of inculcating these in the students. The chemistry students in training are referred to as pre-service chemistry teachers. They should have competencies in teaching including ability to:

- i. Develop functional knowledge of chemistry concepts and principles.
- ii. Observe and explore the chemical environment
- iii. Apply the skills and knowledge of chemistry to solve day to day problems and so on (FRN 2012).

Skill acquisition is necessary in the present day Nigeria considering the dearth of employment amongst school leavers and youths hence the need for entrepreneurial skills acquisition. Acquisition of entrepreneurial skills and aptitude through science laboratory and workshop practices and other curriculum and extracurricular activities represent the most natural ways of stimulating science education and real life work which will lead to high productivity (Adeyemo 2009). Hence the need to focus on skill

development and assessment in our teacher education subjects such as physics, chemistry, biology, integrated science and so on.

Review of Related Literature

Concept of Entrepreneurial Skills

Hornby (2006) defines entrepreneurial skills as those skilled required to start or run a business involving taking financial risks. Entrepreneurial skills are skills needed by an individual to succeed in business especially after graduation (Agommuoh 2018) inculcating in students the practical skills and experience needed for self-employed and self reliant could be achieved through entrepreneurship education.

Entrepreneurial skills is the ability to create something new with value by devoting the necessary time and effort, assuming the accompanying financial psychic and social risks and receiving the resulting reward of monetary and personal satisfaction and independence (Hisrich & Peters in Adeyemo 2009). Supporting this, Olagunju (2004) defined entrepreneurial skill as the ability of an individual to exploit an idea and create an enterprise (Small or big) not only for personal gain but also for social and developmental gain.

Entrepreneurial skill according to Anho (2014) is associated with various activities but not limited to the following innovations - creativity, risk taking, initiative, visionary, focus, determination, team spirit, resourcefulness, financial control, self confidence, versatility, knowledgeable, dynamic thinking, optimum disposition, originality, people oriented flexible in decision, responses to suggestions and criticism, need achievement driven, profit oriented, persistent and preserving, energy for hard work, adjust to challenges and future looking. These activities mentioned calls for the entrepreneur to posses the mentioned attributes for entrepreneurial practices.

The current study intends to determine pre-service chemistry teacher's entrepreneurial skill acquisition in terms of their application of necessary process skill in the production of soap, detergent liquid soap, car wash and ethanol from palm wine

Advantages of Entrepreneurial Skill Acquisition

- Entrepreneurial skill acquisition prepares students for working situation which they will encounter after graduation
- It provides students with opportunity to apply their content knowledge in a practical situation
- It exposes students to appropriate innovation instructional strategies which engender active learning.
- It provides an avenue for students in institution of higher learning to acquire skills in their courses of study which lead them to skill acquisition.
- It offers graduates opportunity to create small scale business for wealth creation

Concept of Entrepreneurship Education

Entrepreneurship education is defined as education given to an individual which will help him develop the skills needed for the management of any business venture (Ezema 2000). Ezema went further to explain that this type of education helps the person to take financial risk and at the same time utilize the material and human resources available to him to achieve the aim of establishing the business. Aruma (2009) explained that entrepreneurial education reduces poverty, creates wealth, generates employment and enhances local production of goods and services. It therefore implies that sustainable development could be achieved in Nigeria particularly amongst pre-service chemistry teachers if they are immersed in real-life learning situation of risk taking entrepreneurial knowledge and inculcating in them skills that are socially usable, thereby producing self-reliant graduates who can utilize the skills they have acquired to establish personal businesses.

Entrepreneurship education constitutes a formidable tool necessary for equipping youths and school leavers with relevant skills and competencies required for production of goods and services relevant for survival of a nation.

Ezenwanne (2005) in Ezenduka and Achufusi, (2016) posited that entrepreneurship involves the acquisition of skills, knowledge and competences that enable learners maximize the existing resources for firm career commitments such as setting a business, marketing services or being able to produce employee of an organization.

In support of the above statements, Okeke and Okorie (2014) stated that advantages of entrepreneurial education include the following:

- It equips students with the necessary skills to form a base of knowledge about the functions and operation of a business and develop some level of familiarity with the business environment.
- It also plays a complementary role in developing the knowledge, job skills and work experience among teachers and students
- It offers opportunities to students for job experience and for earning, saving and investing at an earlier stage of life than their peers
- It leads to great reduction in unemployment in our society; aids self employment and business ownership will be viable and appealing goals for today's youths
- Effective utilization of local resources, decentralization and diversification of business, promotion of science and technology; capital formation; promotion of entrepreneurial culture.

Theoretical Framework

This study is anchored on objective and constructivist epistemologies. Traditional teaching methods often adopted by teachers derive their impetus from objectivist epistemology which asserts that reality can be objectively known (Kalu 2018).

Objectivism is the notion that learners absorb knowledge passively. Studies on student's preconceptions or alternative frameworks in science for the past few decades have shown that this is not the case. The result of studies (Duit, 1993) and so on provides evidence that learners hold pre-instructional conception in many subject matter contents which may facilitate or hinder effective learning of materials. A more viable alternative to objectivism is the evolution of constructivism.

Constructivism is of the viewpoint that individuals construct knowledge in their own understanding and experience. Social constructivism recognizes the fact that individuals construct their own meaning of new phenomenon within social setting involving collaboration, group interaction which is not only personally constructed but is also socially mediated (Taylor, 1993 in Kalu 2018). From the view expressed the objectivism has to do with traditional teaching method (lecture) while constructivism deals with active-learning instructional strategies which are a combination of field trip, demonstration and project strategies. The essential difference between constructivist approach to teaching and the traditional model is that in constructivism the point is not to transfer knowledge from teacher to a group of learners but to facilitate the individual learners' ability to build and extend existing knowledge within a given domain. The characteristics of constructivist teaching and learning include the following amongst others: higher order thinking skills, deep understanding; teachers serve as guides, monitors, coaches, facilitators and so on (Murphy, 1997).

Empirical Review

Entrepreneurship education has been included in the curriculum of tertiary institution such as colleges of education and degree programme as a general studies course but Akpomi (2009), Ochuba and Anyaeneh (2017), in their studies identified that classroom delivery in entrepreneurship was rhetorical and education mechanistic whereby lecture method is in use which does not promote or encourage entrepreneurial behavior.

Njelita and Udogu (2009) identified that pre-service chemistry teachers lack production skills-the production of ethanol, antiseptics, disinfectants, shoe polish and so on, while they possess skills in the production of soap and common salt. The study also revealed the need for field trip to manufacturing industries, adopting appropriate instructional strategies.

In another study by Ezenduka and Achufusi (2016) on effect of demonstration and project instructional strategies on pre-service biology teachers' acquisition of entrepreneurial skills revealed that pre-service biology teachers exposed to demonstration and project instructional strategies performed better than those exposed to lecture method in the acquisition of entrepreneurial skills. On gender, those exposed to demonstration and project strategies female preservice biology teachers performed better than their male counterparts but the difference is not significant.

Again, Chiekezie, Nzewi and Iyekekpolor (2016) in their study on entrepreneurial skills acquisition and job creation in Benin-city examined the extent of relationship between

entrepreneurial skills acquisition and job creation. The findings of the study revealed that the acquisition of entrepreneurial skill is an indispensable means of making job available in Benin-city of Nigeria. There is a positive relationship between entrepreneurial skills acquisition and job creation. It is therefore imperative that appropriate instructional strategies are to be integrated in the chemistry classroom for the inculcation of entrepreneurial skills amongst pre-service chemistry teachers which is Active Learning Instructional Strategies (ALIS).

Active Learning Instructional Strategies (ALIS) include a wide range of activities that share common elements of involving students in doing things and thinking about the things they are doing (Bouwell and Eison 1991 in Egolum and Njelita 2015). This learning strategy can be created and used to engage students in;

- Thinking critically and creatively
- Speaking and working with partners in a small group, or with the entire class.
- Expressing ideas through writing
- Exploring personal attitudes and values
- Giving or receiving feedback and reflecting upon the learning process. It can be done by either with or without the use of technology tools

Categories of ALIS that could be used in an active learning classroom include:

- i. Individual activities
- ii. Paired activities
- iii. Informal small groups or cooperative students projects

According to Asiriwa (2009) in Egolum and Njelita (2015) ALIS as a teaching/learning strategies emphasizes the planning, teaching and assessment which focuses on needs and abilities of the learners. The learners are actively engaged in doing most of the work by using their hands and brain in the teaching/learning process. This teaching/learning process provide learners the opportunity to engage in measuring, communicating, manipulating, observing, handling, performing experiment, recording, reporting and so on. When learners are actively engage in the classroom there will be learner/teacher interaction, learner/learner interaction, information retention, team work and communication skills are enhanced.

There are many active learning strategies that could be used in teaching students Chemistry. They include brain-storming, problem solving approach, process based approach, role-playing, field trip, demonstration, project method, think-pair-share, role playing and so on. The researcher therefore seeks to integrate field trip, demonstration and project strategies as the part of ALIS to be adopted in the present study.

Field trip involves excursion taken outside the classroom for the purpose of making observations and also or obtaining some specific information. It includes visits to various exciting places which can provide or enrich learning. They are meant to broaden and deepen students' general knowledge (Okoye, 2014). During such excursion, students can visit places of interest such as factories/Industries that engage in soap, detergent,

ethanol production and so on. When students engage in such visits, students are exposed to observation or application of scientific concepts and processes learnt theoretically in the class. Hence they are provided with experiences in natural setting and acquisition of entrepreneurial skills.

Some advantages of field trip include that it:

- Provides students the opportunity to visit new places and new environment
- Through field trip, students learn by doing which is a hands-on experience
- It provides new challenges that awaken students' interest to learn and set new learning information.
- It encourages the acquisition of entrepreneurial skills particularly this period of unemployment in the society students can then create wealth.

Demonstration as one of strategies in ALIS involves showing by reason or proof, explaining or making clear by use of examples or experiments which allows learners to relate theoretical concept to practice. It is a learning experience that involves students' activities such as measuring, observing, experimenting, counting and so on. (Ezenduka and Achufusi 2016). Again demonstration could be done either by the teacher or alone, the teacher and the students or group of students (Okoye, 2014). This may involve the teacher demonstrating the preparation of soap, student helping in the mixing or student group demonstrating the preparation of that soap in their group. Demonstration can be applied in combination with other ALIS techniques such as project in order to achieve the expected learning outcome.

Project method could be in form of individualized instruction whereby the learner performs a unit of work in a natural manner. Individual students or groups of student may work on a given task to arrive at a common goal under the guidance or supervision of the teacher. The project topic is chosen on the basis of the background, experience or interest of the students and the work should be an original work, honestly performed by the students (Okoye 2014). Project method provides an excellent opportunity for the complete act of thinking by the students during which students can define the problem, plan their work, find appropriate resources, carryout their plans and draw conclusion (Udichukwu 2016). Hence project work encourages creativity, originality, promotes individualized learning collaboration amongst students and builds self-confidence in the learners. After the projects, pre-service chemistry teachers are assessed to determine their achievements.

Achievement in science generally is an important variable that expresses the success or failure of a teaching/learning process. Achievement is referred to as scholastic standing of a learner at a given moment which can be measured by grades obtained from examination or assessment.

Gender is a constructed role and responsibilities expected of males and females. It is a factor that influences much educational attainment all over the world. According to Eze (2008) gender issue is a pertinent factor in education setting in Nigeria that could be a

factor that leads to low or high achievement of learners in Chemistry hence gender issue is none conclusive.

Problem of the Study

Chemistry as a subject has been taught over the years. The issue is that students after graduating cannot be self-employed because they lack necessary skills for self-reliance. They were not taught 'how' to apply them which will help in job/wealth creation as well as achieving self-reliance. Many researchers have advocated that innovative instructional strategies enhance acquisition of entrepreneurial skills for job/wealth creation. They include exposing learners to field trip, demonstration, guided inquiry, projects and active learning instructional strategies. There is no research work known to the researcher in Chemistry on the effect of active learning instruction strategies on entrepreneurial skills acquisition in teacher education programme. Hence the current study intends to identify the effect of active learning instructional strategies using the combination of field trip, demonstration and project on pre-service chemistry teachers' entrepreneurial skills acquisition.

Purpose of the Study

The purpose of the study is to determine the effect of active learning instructional strategies on pre-service chemistry teacher's achievement in acquisition of entrepreneurial skills. The study was specifically aimed at determining:

1. The relative effects of selected lecture and active learning instructional strategies on pre-service chemistry teachers achievement in acquisition of entrepreneurial skills
2. The influence of gender on mean entrepreneurial skills achievement scores of pre-service chemistry teachers exposed to active learning instructional strategies

Research Questions

The following research questions guided the study:

1. What is the mean entrepreneurial skills achievement scores for pre-service chemistry teachers taught using active learning instructional strategies and those taught with lecture method
2. What is the mean entrepreneurial skills achievement score of male and female pre-service chemistry teachers taught with active learning instructional strategies

Research Hypotheses:

The following null hypotheses guided the study at 0.05 level of significance

Ho₁: There is no significant difference between the mean entrepreneurial skill achievement score of pre-service chemistry teachers taught with the active learning instructional strategy (experimental group) and those taught with lecture (control group) method.

Ho₂: There is no significant difference between the mean entrepreneurial skill achievement score of male and female pre-service chemistry teachers exposed to active learning instructional strategy (experimental group).

Method

Design

The study adopted quasi-experimental design involving pre-test, post-test, non-equivalent control group. Two intact classes were used.

Sample

The sample comprised of all the one hundred and twenty (120) pre-service chemistry teachers taking courses for National Certificate in Education (NCE year II) programme in two colleges of education in South-East Geopolitical zone of Nigeria. The colleges were purposively selected based on

- Proximity of the institutions
- Students offering chemistry as one of their subject combination
- The pre-service chemistry teachers used for the study were of reasonable number
- Availability of a functional chemistry laboratory with needed equipment for inculcating entrepreneurial skills

Instrumentation

The instrument for data collection comprised of Test on Entrepreneurial Skills Acquisitions (TOESA) developed by the researcher. The TOESA had twenty-five (25) items short answer questions which were drawn from the following chemistry concepts in NCE year two programme based on National Curriculum for Colleges of Education (NCCE) – 2012 edition. They include:

- Manufacture of soap, detergent, liquid soap, car wash
- Manufacture of ethanol

The face and content validity of the instrument were determined by giving the TOESA to two experts from chemistry department and one person from measurement and evaluation all from Nwafor Orizu College of Education, Nsugbe. Their inputs and corrections were articulated to produce the final drafts of the instrument. The reliability of the instrument was determined by administering it to twenty (20) preservice chemistry teachers in Federal College of education, Umuze in Anambra State using Kuder-Richardson formula – 21 which gave a reliability coefficient of 0.89. Means and standard deviations were used to analyse the data obtained for research questions. The hypotheses were tested using ANCOVA – Analysis of covariance at 0.05 level of significance.

Instructional Procedure: Two institutions were used for the study. They were; Nwafor Orizu College of Education Nsugbe, Anambra State of Nigeria and College of Education (Technical) Enugu in Enugu State of Nigeria. The former was used as the experimental group and was taught by the researcher while the later served as the control group and were taught by their lecturer.

The study lasted for five (5) weeks and the breakdown was as follows for the

Experimental Group

- Week 1: Pre-test and field trip
- Week 2: Demonstration of production of soap, detergent, liquid soap and car wash
- Week 3: Demonstration of production of ethanol from fermented palm wine and revision
- Week 4: project work on production of items mentioned above
- Week 5: Post-test

Control Group

- Week 1: Pre-test
- Week 2: Lecture on production of soap, detergent, liquid soap and car wash
- Week 3: Lecture on production of ethanol from fermented palm wine
- Week 4: Revision on Production of items mentioned above
- Week 5: Post-test

The experimental group went on field trip with the researcher to an industry manufacturing soap, detergent, liquid soap and car wash at Nnewi. They also visited Atani near Nnewi that is noted for production of ethanol from locally fermented palm wine.

The researcher prepared two lesson plans one for the control group and the other for the experimental group. The control group was taught by course lecturer who was trained on how to teach for one week. The experimental group was exposed field trip to the production of the products mentioned earlier followed by demonstration on production of the mentioned products. After the demonstration lesson, the pre-service chemistry teachers were assigned to project groups. They prepared the products mentioned above applying necessary entrepreneurial skills.

Method of Data Analysis

The data collected were analysed using descriptive statistics: means and standard deviations used to answer the research questions. The hypotheses were tested at 5% level of significance using the Analysis of Covariance (ANCOVA) Statistics. All the analysis was done with the aid of Statistical Package for Social Sciences (SPSS) version 25 software.

One-way ANCOVA statistics was used to analyse the data and test the hypotheses. The purpose of the one-way ANCOVA is to test for a statistically significant difference between two or more independent samples (or levels of an independent variable) after

statistically controlling for the effects of a 'third variable' referred to as a covariate (Allen, Bennett & Heritage, 2019).

Results

Research Question 1:

What is the mean entrepreneurial skill achievement score of pre-service chemistry teachers taught using active learning instructional strategies (experimental) and those taught with conventional (control) method?

Univariate Analysis of Variance

Table 1: Descriptive Statistics

Dependent Variable: Score

Method	Mean	Std. Deviation	N
Control	46.7800	10.97801	50
Experimental	56.2143	18.58474	70
Total	52.2833	16.50824	120

From table 1, the first output from the ANCOVA analysis is the table of 'Descriptive Statistics'. This simply shows that there are 70 participants in the experimental group and 50 in the control group, that is those used in the pre-test and those used for the post-test results. Participants in the control group had a mean score of 46.7800 while participants in the experimental group had a mean score of 56.2143. This implies that those in the experimental group had higher mean than those in the control group. From this we proceed to test hypothesis one.

Hypothesis One:

There is no significant difference between the mean entrepreneurial skill achievement score of pre-service chemistry teachers taught with the active learning instructional strategy (experimental group) and those taught with conventional (control) method.

Table 2: Tests of Between-Subjects Effects

Dependent Variable: Experimental and Control Score

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	5211.424 ^a	2	2605.712	10.306	.000
Intercept	29336.100	1	29336.100	116.030	.000
Method	5200.600	1	5200.600	20.569	.000
Gender	19.422	1	19.422	.077	.782
Error	59921.310	237	252.833		
Total	721184.000	120			

Corrected Total	65132.733	118			
-----------------	-----------	-----	--	--	--

a. R Squared = .080 (Adjusted R Squared = .072)

To validate this hypothesis we look at the ANCOVA result table (table 2) on 'Tests of Between-Subjects Effects'. The result indicate that there is a statistically significant difference in the mean entrepreneurial skill achievement score of pre-service chemistry teachers taught with ALIS and the conventional lecture method. $F(1,237) = 20.569$, $p = .000$, which is less than the 5% or .05 margin of error/level of significance. Based on this, the null hypothesis is rejected and the alternative accepted.

Research Question 2:

What is the mean entrepreneurial skill achievement score of male and female pre-service chemistry teachers exposed to active learning instructional strategies (experimental) group?

Table 3: Descriptive Statistics

Dependent Variable: experimental group

Gender	Mean	Std. Deviation	N
Female	55.8500	18.35969	50
Male	57.1250	19.34331	20
Total	56.2143	18.58474	70

Descriptive Statistics in table 3 above provides basic descriptive information for each group of scores. There are 70 participants in the experimental group made up of 50 females and 20 males. Female participants had a mean score of 55.8500 while the male participants had mean score of 56.2143. This shows that the males have higher mean score than the female participants.

Hypothesis Two:

There is no significant difference between the mean entrepreneurial skill achievement score of male and female pre-service chemistry teachers exposed to active learning instructional strategy (experimental group).

Table 4: Tests of Between-Subjects Effects

Dependent Variable: Score Exp.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	46565.761 ^a	2	23282.880	2209.261	.000
Intercept	45822.010	1	45822.010	4347.949	.000
Gender Exp.	46.446	1	46.446	4.407	.038
Method Exp.	46519.314	1	46519.314	4414.115	.000
Error	1443.811	137	10.539		
Total	490416.000	140			
Corrected Total	48009.571	139			

a. R Squared = .970 (Adjusted R Squared = .969)

ANCOVA result in table 4 on 'Tests of Between-Subjects Effects' above. The result indicate that there is a statistically significant difference between the mean skill score of male and female pre-service chemistry teachers taught with ALS method. $F(1,137) = 46.446$, $p = .038$, which is less than the 5% or .05 margin of error/level of significance. Based on this, the null hypothesis is rejected and the alternate accepted.

Discussion

The result of this study revealed that the use of selected ALIS-field trip, demonstration and projects had significant effect on preservice chemistry teachers acquisition of entrepreneurial skills compared with those taught with convention lecture method. The selected ALIS provided the pre-service chemistry teachers opportunity to engage in hands-on activities and techniques involving exploration, collaboration among learners. This enabled them to create new products. The findings of this study is in line with the findings of Ezenduka and Achufusi (2016) where their pre-service biology teachers exposed to demonstration and projects performed better than their control group on gender difference for male and female pre-service chemistry teachers exposed to selected ALIS, the male performed significantly better than their female counterparts. This finding did not corroborate with the findings of Ezenduka and Achufusi (2016) who reported non-significant difference in their experimental group based on gender.

Conclusion

In conclusion, the use of field trip combined with demonstration and project selected from ALIS have significantly enhanced the acquisition of entrepreneurial skills among preservice chemistry teachers compared with conventional lecture method. The findings of the study also revealed that there is gender difference in the acquisition of entrepreneurial skills and this is in favour of male folk.

Recommendations

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

- Chemistry educators should endeavour to use active learning instructional strategies (ALIS) particular field trip, demonstration and projects to enhance acquisition of entrepreneurial skills amongst preservice chemistry teachers.
- Chemistry educators should ensure that they use ALIS in their teacher education programmes in order to acquaint the pre-service chemistry teachers and other science, technology and mathematics educator with the Active Learning Instructional strategies.
- Teacher educators should be exposed to innovative instructional strategies that enhance entrepreneurial skill acquisition such as ALIS
- Existing science textbooks on methods of teaching should be reviewed to include active learning instructional strategies.

REFERENCES

- AGOMMUOH, P.C. (2018). Acquisition of Entrepreneurial Skills: a Pedagogical Reorientation for Physic Teachers. In *Perspective on Science and technological education in Nigeria*. Z.C Njoku, U.M. Nzewi and C.V. Nnaka (eds) 248- 256. Nsukka: Great AP Express Publishers Ltd Nigeria.
- AKPOMI, M.E. (2009). Achieving Millennium Development Goals Through Teaching of Entrepreneurship Education in Nigeria. Higher education institution. *European Journal of Social Science* 8(1): 15, 2-159.
- ALLEN, P. BENNETT, K. and HERITAGE, B. (2019). *SPSS Statistics: A practical Guide*, 4th Edition, South Melbourne, Australia: Cengage Learning.
- ATTAH, F.O. and NJOKU, Z.C. (2018). Effects of Two Teaching Methods on Secondary School Students Achievement in Writing and Balancing Chemical Equations. In *Perspectives on Science and Technological Education in Nigeria*. Z.C. Njoku, U.M. Nzewi and C.V. Nnaka (eds) 302–310. Nsukka: Great AP Express Publishers Ltd Nigeria.
- DUIT, R. (1993) in KALU, I. (2018). Student Gender, School Proprietorship, School Type and Secondary School Students Perception of the Constructivist Learning Environment of Biology Classroom. In *Perspective on Science and Technology Education in Nigeria*. Njoku, Z.C., Nzewi U.M. and Nnaka, C.V. (ed) Nsukka: Great AP Express Publishers Ltd.
- EGOLUM E.O. and NJELITA, C.B. (2015). Teaching Chemistry for Relevance through Active Learning Instructional Strategies (ALIS). *Journal of Science Education* vol. 12, 1, s. 34 – 44.
- EZE, C.C. (2008). Comparative Effects of Two Questioning Techniques on Students Achievement, Retention and Interest. *Unpublished M.Ed Thesis*. Department of Science Education. University of Nigeria, Nsukka.
- EZEMA, P.U. (2000) in AGOMMUOH, P.C. (2018). Acquisition of Entrepreneurial Skills: a Pedagogical Reorientation for Physic Teachers. In *perspective on Science and technological education in Nigeria* Z.C Njoku, U.M. Nzewi and C.V. Nnaka (eds) 248- 256. Nsukka: Great AP Express Publishers Ltd Nigeria.

- EZENDUKA C.U & ACHUFUSI, J.N. (2016). Effect of Demonstration and Project Instructional Strategies on Pre-service Biology Teachers' Acquisition of Entrepreneurial Skills. *International Journal of Tropical Issues* vol. 1, No. 1, 166 – 174.
- FEDERAL REPUBLIC OF NIGERIA (2012). *National Commission for Colleges of Education Nigeria Certificate in Education*. Minimum standard for Science 2012 edition. Tetfund project: Tertiary Education Trust fund.
- HISRICH, R.C. and PETERS, M.P. (2002). *Entrepreneurship*. Boston McGraw Hill.
- HORNBY, S.A. (2006). *Oxford Advanced Learners Dictionary of Current English*. New York: Oxford University Press.
- KALU, I. (2018). Student Gender, School Proprietorship, School Type and Secondary School Students Perception of the Constructivist Learning Environment of Biology Classroom. In *Perspective on Science and Technology Education in Nigeria*. Njoku, Z.C., Nzewi U.M. and Nnaka, C.V. (ed) Nsukka: Great AP Express Publishers Ltd.
- MURPHY E. (1997) in KALU (2018). Student Gender, School Proprietorship, School Type and Secondary School Students Perception of the Constructivist Learning Environment of Biology Classroom. In *Perspective on Science and Technology Education in Nigeria*. Njoku, Z.C., Nzewi U.M. and Nnaka, C.V. (ed) Nsukka: Great AP Express Publishers Ltd.
- NJELITA, C.B and UDOGU, M.E. (2009): Production Skills Inculcated by Chemistry Educators and those Possessed by Pre-service NCE Chemistry Teachers – Implication for Entrepreneurial Education. *50th Annual Conference Proceedings of Science Teachers Association of Nigeria*. 182 – 186.
- NJELITA, C.B. (2005). Chemistry Teachers Perception and Observed Instructional Practices. *Unpublished Ph.D Dissertation* Awka: Nnamdi Azikiwe University.
- OCHUBA, C.D. and Anyaeneh, U.K. (2017). Entrepreneurship Education: Implication for Self-Reliance among NCE Students of Federal College of Education, Umunze, Anambra State. *Journal of Science Education*, vol. 13, No. 1, s.143 – 153.
- OKEKE, F.C, and OKORIE, F.U. (2014). *Empowering the Nigerian Youths for a Sustainable Economic Development Through Entrepreneurship Education*. In *Issues and Challenges of Entrepreneurial Education in Nigeria*. J.E. Tabotndip, I.O. Erukoha, J.C. Obunadike (eds) 52 – 85.
- OKOYE, P.O. (2014). Method of Teaching Science. Mary Ann Udogu, Nnamdi Egbeama and Felicia Nwakonobi (Eds) in *Readings in Science Methodology for Tertiary Institutions*. 293 - 327 Onitsha. New crest publishers.
- OLAGUNJU, Y.A (2004). *Entrepreneurship and Small Scale Businesses Enterprises Development in Nigeria*: Ibadan: University press plc
- TAYLOR, P.C.S. (1993) in KALU, I (2018). Student Gender, School Proprietorship, School Type and Secondary School Students Perception of the Constructivist Learning Environment of Biology Classroom. In *Perspective on Science and Technology Education in Nigeria*. Njoku, Z.C., Nzewi U.M. and Nnaka, C.V. (ed) Nsukka: Great AP Express Publishers Ltd.
- UDUCHUKWU, N.A. (2016). *Remedying Students Deficiencies in Distillation and Fractional Distillation Separation Techniques through Project and Inquiry Methods*. P.E. Ibole, Margaret A.C. Enedoh, E.T. Owoyemi, E.N. Igboegwu in *Nature of matter and separation techniques*. Science Teachers Association of Nigeria (STAN) Chemistry Panel Series 12 pg. 41 – 45.