EFFECTS OF PROJECT AND DEMONSTRATION TEACHING APPROACHES ON STUDENTS' AGRICULTURAL SKILLS ACQUISITION IN COLLEGES OF EDUCATION, PLATEAU, NIGERIA

[*1]Grace N. ALKALI and [2]Pangkhinah Wuyep BAKO

[1]Agricultural Science Department, Kaduna State College of Education, Gidan Waya
[2]Directorate of Research, Planning and Documentation, Plateau State
[*]Corresponding Author: gracealkalicoe@gmail.com

Abstract

This research was carried out to determine the effects of demonstration and project teaching approaches on the acquisition of agricultural skills among students in colleges of education in Plateau State, Nigeria. The study adopted a Quasi-experimental, pretest-post-test design. The population for the study consists of all the 147-year-two agricultural education students of the two colleges of education in Plateau State. Purposive sampling was used to select the Federal College of Education, Pankshin, and 75 students were selected using a simple random sampling technique. A 25-item multiple-choice Agricultural Skill Acquisition Test (ASAT) was used as an instrument for data collection. Research questions were answered using mean and standard deviation, while t-test statistics were used to test the null hypotheses at the .05 level of significance (P=0.05). The findings revealed that both project and demonstration teaching approaches have significant effects on students' acquisition of agricultural skills. The result also showed that, project teaching approach is more effective in teaching agricultural skills than the demonstration teaching approach. The study concluded that the project teaching approach will enhance students' acquisition of agricultural skills than the demonstration teaching approach, and that the use of project and demonstration teaching approaches to teach agricultural skills will be more effective in facilitating agricultural education students' acquisition of agricultural skills than the conventional lecture approach. The researcher recommended that curriculum planners and agricultural education teachers should emphasise the importance of using project and demonstration teaching approaches in colleges of education.

Keywords: Project, demonstration, teaching approaches, agricultural skills, acquisition, colleges of education

Introduction

Agricultural science education, as one of the core vocational education courses taught in Colleges of Education, can be a key driver of economic growth and skills acquisition if the appropriate teaching approaches are used to teach the students. This is because vocational education is generally aimed at providing the technical knowledge and skills required for career application. The emergence of career education and rising interest in job-related courses, and the employers of labour's emphasis on production skills acquisition before job placement, have generated a need for rapid expansion of employment-related education in Nigeria, especially now that the country is under the pressure of high unemployment and under-employment rates. To reduce this menace and to also achieve the goal of vocational education at the colleges of education, teachers have to use the required teaching approaches in teaching the various vocational skills as outlined by the curricula of the Nigerian Certificate of Education (NCE).

There are several teaching approaches available to the agricultural education teachers in colleges of education, such as demonstration, discussion, field trip, lecture, most of which are practical approaches. Amoah (2009) supported these by stating that agricultural education programme content, teaching, and learning should be practical-oriented. This follows the agricultural pedagogical fact that vocational skills are better acquired when the learners (students) learn by doing. The duration for learning a skill and the level of competencies a learner attained at the end are also dependent on how the learner is being taught. The desire for a functional

instructional approach to teaching and learning is becoming stronger among teachers at all levels of educational systems is proof to the fact of teaching approaches are important to knowledge transmission. Therefore, the study looked at how these teaching approaches, projects, and demonstrations can have effects on the acquisition of agricultural skills.

A project is a whole-hearted, purposeful activity proceeding in a social environment. It is a bit of real life that has been imparted into school. The Project Approach refers to a set of teaching strategies that enable teachers to guide children through in-depth studies of real-world topics. The Project Approach is not unstructured. There is a complex but flexible framework with features that characterise the teaching-learning interaction. When teachers implement the Project Approach successfully, children can be highly motivated, feel actively involved in their own learning, and produce work of high quality (Chard, 2004). A project is an in-depth investigation of a topic worth learning more about. The investigation is usually undertaken by a small group of children within a class, sometimes by a whole class, and occasionally by an individual child. The key feature of a project is that it is a research effort deliberately focused on finding answers to questions about a topic posed either by the children, the teacher, or the teacher working with the children (Katz & Helm, 2001).

According to Udofia and Aniefiok (2013), the project approach can be carried out by creating the proper situation for the students by the teacher in the class. The students evaluate their task by determining whether the objectives are achieved or not. After that, they criticise and express their feeling about the task freely. It should include the proposal, plan and its discussion, duties allotted to different students and how far they were carried out by them. It should also include the details of places visited and surveyed guidance for future and all other possible details (Nsa, 2002). Project Approach refers to a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks (Robert & Harlin, 2007). This process can last for varying time periods and can extend over multiple content areas. It is a set of teaching approaches which enable teachers to guide students through in-depth studies of real-world topics.

This set of approaches, according to Udofia and Aniefiok (2013), involves experimentation, instructions and illustration. Projects are described as having a complex but flexible structural framework with features that characterise the teaching-learning interaction, depending largely on instructional approaches. The project approach is one of the instructional approaches used by vocational and technical instructors as it enables students' participation and fast acquisition of skills. Furthermore, project approach is like assignment method in which a task is given to the students or several tasks are shared to students to carry out (written or practical) allowing a great deal of students' involvement right from the planning stage, the skh of the project, the steps of executing it, the tools, equipment and materials to be used up to the assembling stage of the project. The project seems to be a versatile teaching approach which facilitates teaching and assessing learners' performance simultaneously without negatively impacting the learner who learns independently. The project instructional approach is one of the instructional approaches used by technical instructors as it enables students' participation and fast acquisition of skills (Edu et al., 2012).

The most effective way to teach an occupational skill is to demonstrate it. Demonstration involves showing by reason or proof, explaining or making clear by use of examples or experiments. Put more simply, demonstration means to clearly show (Sola & Oloyede, 2007). In teaching by demonstration, students are set up to potentially conceptualise class material more effectively, as shown in a study which specifically focuses on demonstrations presented by teachers (Bruce et al., 2009). Demonstration approach is effective with both large and small groups. The greater the degree of participation and sensory involvement by the learner, the more effective learning will be. Teachers can improve the use of the demonstration approach in the classroom by allowing students to use several senses, which involve seeing, hearing and possibly experiencing. Also, ideas should be presented to stimulate interest. If these precautionary measures are not taken, the demonstration can limit students' participation.

According to Achounye (2002), the demonstration approach is a practical method of teaching. It involves showing, doing and telling something. Therefore, the teacher needs to display the steps in the process and explain them accurately and clearly, while students are expected to practice by repeating the things the teacher

has done. Demonstration means any planned performance of an occupational skill, scientific principle or experiment. Demonstration approach has emerged to become an instructional approach that is gaining growing interest within the engineering education community (Hadim & Esche, 2002). Duch (2002) described the demonstration approach as an instructional strategy that challenges students to 'learn how to learn', working cooperatively in groups to seek solutions to real-world problems. Prpic and Hadgraft (2009) addressed the key ingredients of the demonstration approach and postulated that it should not be confused with design projects or case studies, where the focus is predominantly on the application of existing knowledge and integration of what is already known. Demonstration approach goes beyond these; students will encounter some concepts for the first time, and therefore they need strategies for acquiring this new knowledge (Prpic & Hadgraft, 2009). Demonstration instructional approach is a method of teaching concepts, principles or real things by combining explanation with handling or manipulation of real things, equipment or materials (Edu et al., 2012).

The teacher has to pay attention to all safety rules, precautions and procedures; and emphasise them to the students. Use proper instructions, aids such as chalkboard, charts, and handouts, to support the demonstration. Provide for trainees' participation where possible, during and after the demonstration. Demonstrate the correct way only. First impressions are important; therefore, make them correct ones and always summarise the steps and emphasise key points again (Ogologo & Wagbara, 2013). Demonstration teaching approach is a method of teaching concepts, principles or real things by combining explanation with handling or manipulation of real things, equipment or materials (Edu *et al*. 2012). It involves showing by reason or proof, explaining or making clear by use of examples or experiments. Therefore, the greater the degree of participation and sensory involvement by the learner during the demonstration, the more effective learning will be. Also, ideas should be presented to stimulate interest. If these precautionary measures are not taken, the demonstration can limit student participation. Demonstration approach can bridge the gap between theory and practice, control the rate of breakages of tools and equipment, and accidents, as students watch the teacher do it before attempting to do the same. It is a learning by doing approach, and so enables the teacher to teach manipulative and operational skills within a short time using little material. To further examine how project and demonstrations affect agricultural skills acquisition was the basis for this study.

Acquisition of Agricultural Skill

Vocational and Technical Education is used as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life (NPE, 2004). The goals of Vocational and Technical Education shall be to provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technical levels; provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and also, to give training and impart the necessary skills to individual who shall be self-reliant economically (NPE, 2004).

Vanpatten and Bennati (2010) defined skill as the ability to do rather than underlying competence or mental representation. Skill acquisition refers to a form of prolonged learning about a family of events. Through many pairings of similar stimuli with particular responses, a person can begin to develop knowledge representations of how to respond in certain situations. These representations have some form of privileged status in memory because they can be retrieved more easily and reliably than memories of single events. Thus, skilled behaviours can become routinised and even automatic under some conditions. Acquisition is a measure of what a person has learned within or up to a given time (Edmond & Ayodele, 2004). It is a measure of accomplished skills and indicates what a person can do at present as a result of learning. So, the acquisition of agricultural skills implies a measure of accomplished or learned skills a person has put into practice at present as an outcome of learning. This means what a student and a graduate of an agricultural training institution is able to do as a result of learning instructions during the period of learning.

Statement of Problem

The researchers observed that there is adequate time for teaching agriculture in colleges of education, and in spite lucrative nature of agribusinesses and the quick return on investment, not many college graduates are

willing to enter into agricultural production as a vocation. One can attribute this to poor acquisition of agricultural skills by these graduates, evident in their inability to gainfully engage in agricultural vocations after graduation. This may be caused by inadequate skills of the learners, consequent upon poor teaching of the production skills. The proceedings of the 43rd annual conference report of the Science Teachers Association of Nigeria (STAN) 2002, reported that emphasis is still on cognitive achievement and passing of examinations and not on production ability (Eleobhose & Uhumuavbi, 2002). The inability to put into practice what is taught is viewed as the cause of the relative backwardness of most societies. This observation has raised doubts on the efficacy of the teaching approaches used by teachers, considering the fact that the goal of all vocational and technical education as provided by the National Policy on Education is to provide technical knowledge and vocational skills necessary for agricultural productivity, development and self-reliance. So, the researcher wonders whether students of colleges of education are generally incapable of understanding and practising taught agricultural skills, or the teaching approaches used in training them are not appropriate to promote adequate acquisition of agricultural skills as provided by the curricula. Though many researchers have expressed worry about the ineffectiveness of the lecture method, it seems to be the most used in teaching agricultural education in colleges of education. Edu et al. (2012) reported that the acquisition of knowledge about employment opportunities, requirements and trends, and the possession of skills and qualifications that are saleable in the employment market, which are the key expectations of modern learning needs, should be the goal of educational institutions.

More so, the teaching of agricultural science at the primary and secondary school levels, where most of the NCE graduates hope to teach, requires a sound background in the practice of agriculture. To effectively teach, they must themselves be well-trained using practical approaches that promote real-world conditions. But previous researchers concentrated most of their work on teaching methods that teachers used at the primary and secondary schools, with little attention to how the teachers themselves were trained. Since the method of presentation is so important, teachers, including pre-service teachers, should be concerned not only with general methodology but also with some special approaches to teaching various subjects (Ogologo & Wagbara, 2013). Therefore, if the colleges of education's agricultural education graduates have to acquire skills that make them functional, teaching approaches that promote participation become necessary. Hence, the need for the study: Effects of Project and Demonstration teaching approaches on acquisition of agricultural skills among students in colleges of education in Plateau state, Nigeria.

Objectives of the Study

The general objective of the study is to investigate the effects of project and demonstration teaching approaches on students' acquisition of agricultural skills in colleges of education in Plateau state, with specific objectives to:

1. Determine the effect of the project teaching approach on students' acquisition of agricultural skills in colleges of education.
2. Identify the effect of the demonstration teaching approach on students' acquisition of agricultural skills in colleges of education.
3. Compare the effect of project and demonstration teaching approaches on students' acquisition of agricultural skills in colleges of education.

Research Questions

1. What effect does the project's teaching approach have on colleges of education students' acquisition of agricultural skills?
2. What is the effect of the demonstration teaching approach on students' acquisition of agricultural skills in colleges of education?
3. Do college of education students differ in their agricultural skills acquisition when they are taught using project and demonstration teaching approaches?

Hypotheses

The following research hypotheses were generated for the study and tested at a 0.05% level of significance (p=0.05):

HO_1: Project teaching approach does not have a significant effect on students' acquisition of agricultural skills in colleges of education.

HO_2: The demonstration Teaching Approach does not have a significant effect on students' acquisition of agricultural skills in colleges of education.

HO_3: There is no significant difference between the effect of project teaching approach and demonstration teaching approach on students' acquisition of agricultural skills in colleges of education.

Methodology

Quasi-experimental design was adopted for the research. The experimental groups were taught using different teaching approaches, and the scores were compared (Akorede et al, 2019; Biu et al., 2025). Quasi-experimental research design is also referred to as before-and-after with control design. The treatment is then introduced, and the dependent variable is measured again after the treatment has been introduced. The effect of the treatment would be equal to the level of the phenomenon after the treatment minus the level of the phenomenon before the treatment (Kothari, 2004). The population for the study consist of 147 year two students of Agricultural Education from the two colleges of education in the state. The researcher used a purposive sampling method to select Federal College of Education, Pankshin and random sampling was used to select 75 out of the 122 year two students in the college served as the sample for the study. Mean and Standard deviation were used to analyse the collected data. Statistical t-test was used to test the hypotheses at 5% level of significance (p=.05). When the calculated t-test value was greater than or equal to the critical t-value (t-calculated ≥t-critical) at 5% level of significance (p=.05), the null hypotheses of no significant difference was rejected, but when the calculated t-value was less than the t-critical value (t-calculated ≤ t-critical) at 5% level of significance, the null hypotheses of no significant difference were retained (Auwal, 2013; Edmond & Ayodele, 2014; and Ogologo & Wagbara, 2013).

Results

Table 1: Means and Standard deviation for the effect of the Project teaching approach.

Group	N	$\bar{X}$	SD	Mean Difference
Project approach post-test	25	20.16	2.85	12.12
Project approach pretest	25	8.04	2.82	

Source: Fieldwork, 2016

Table 1 shows that the mean and standard deviation of project approach post-test scores are 20.16 and 2.85, while the mean and standard deviation for the project approach pretest scores are 8.04 and 2.82. This showed that the post-test scores mean and standard deviation are greater than the pretest scores mean and standard deviation. This revealed a mean difference of 12.12 after the treatment was introduced. So it implied that students performed better when they were taught using the project approach, as seen in the post-test higher mean score. Therefore, it indicates that the project teaching approach has an effect on students' acquisition of agricultural skills.

Table 2: Means and Standard deviations for Demonstration approach pretest and post-test scores.

Group	N	$\bar{X}$	SD	Mean Difference
Demonstration approach post-test	25	16.32	2.82	7.92
Demonstration approach pretest	25	8.40	2.48	

Source: Fieldwork, 2016

Table 2 shows that the mean and standard deviation of demonstration approach post-test scores are 16.32 and 2.82, while the mean and standard deviation for the pretest scores are 8.40 and 2.48, with a mean difference of

7.92 between the pretest scores and post-test scores. This showed that the mean and standard deviation for students exposed to the demonstration approach post-test scores are greater than the pretest scores mean and standard deviation of students before the treatment. So, it implies that students performed better when they were taught using a demonstration approach, as shown in the difference of the means. Therefore, it indicates that the demonstration teaching approach has an effect on students' acquisition of agricultural skills.

Table 3: Means and Standard Deviations for Project and Demonstration Groups.

Group	N	$\bar{X}$	SD	Mean Difference
Project group post-test	25	20.16	2.85	3.84
Demonstration group post-test	25	16.32	2.82	

Source: Fieldwork, 2016

Table 3 shows that the mean and standard deviation of project approach post-test scores are 20.16 and 2.85, while the mean and standard deviation for the demonstration group post-test scores are 16.32 and 2.82. This showed that the mean and standard deviation for project teaching approach post-test scores are greater than the mean and standard deviation post-test scores for the demonstration approach group. So it implies that students performed better when they were taught using the project approach than those taught using the demonstration approach. Therefore, it indicates that the project teaching approach has a greater effect on students' acquisition of agricultural skills.

Test of Null Hypotheses

To test the null hypotheses 1and 2, the post-test scores of students taught using project and demonstration teaching approaches were compared with the post-test scores of the control group (lecture approach), while hypothesis three was tested by comparing the post-test scores of students taught using the project teaching approach with the post-test scores of those exposed to the demonstration teaching approach. The t-test statistics were used to analyse the scores at 5% level of significance (p=.05).

Table 4: Effect of Project Teaching Approach on Students' Skill Acquisition

Group	N	$\bar{X}$	SD	t-calc	t-crit.	Decision
Project approach post-test	25	20.16	2.85	14.76	2.09	Sig.
Project approach pretest	25	12.04	2.82			
Df=24						P=.05

Source: Fieldwork, 2016

Table 4 t-test analysis result showed that the t-calculated is 14.76, which is greater than the t-critical value of 2.09 at the .05 level of significance. This result, therefore, showed that the project teaching approach has a significant effect on students' agricultural skills acquisition. So, the null hypothesis that the project teaching approach does not have a significant effect on students' acquisition of agricultural skills was rejected.

Table 5: Effect of Demonstration Teaching Approach on Students' Skill Acquisition

Group	N	$\bar{X}$	SD	t-calc	t-crit.	Decision
Demonstration approach post-test	25	16.32	2.82	9.93	2.09	Sig
Demonstration approach pretest	25	8.40	2.48			
Df=24						P=.05

Source: Fieldwork, 2016

Table 5 t-test analysis result showed that the t-calculated is 9.93, which is greater than the t-critical value of 2.09 at the .05 level of significance. This result showed that the demonstration teaching approach has a significant effect on students' agricultural skills acquisition. Therefore, the null hypothesis that the demonstration teaching approach does not have a significant effect on students' acquisition of agricultural skills was rejected.

Table 6: Difference between the effects of Project and Demonstration Teaching Approaches

Group	N	₹	SD	t-calc	t-crit.	Decision
Project group post-test	25	20.16	2.85	4.89	1.96	Sig
Demonstration group post-test	25	16.32	2.82			
Df=48						P=.05

Source: Fieldwork, 2016

Table 6 showed the t-test analysis for the difference between the level of students' agricultural skills acquisition when taught using the project teaching approach and those exposed to the demonstration teaching approach. The t-test analysis result showed that the t-calculated is 4.89, which is greater than the t-critical value of 1.96 at the .05 level of significance. This result implies that there is a significant difference in the levels of students' acquisition of agricultural skills between the project teaching approach and the demonstration teaching approach. Therefore, the stated null hypothesis that there is no significant difference between students taught using the project teaching approach and those exposed to the demonstration teaching approach in their acquisition of agricultural skills was rejected.

Summary of Major Findings

The findings of this research, which was carried out to determine the effects of project and demonstration teaching approaches on students' acquisition of agricultural skills in colleges of education, Plateau State, were based on the results of the descriptive statistics (mean and standard deviation) and t-test analysis. The major findings are summarised as follows:

1. The project teaching approach has a significant effect on students' acquisition of agricultural skills.
2. Demonstration teaching approach also has a significant effect on students' acquisition of agricultural skills.
3. The research also revealed that the project teaching approach was more effective in teaching agricultural skills than the demonstration teaching approach.
4. It was further revealed that the demonstration teaching approach is better than the traditional lecture approach in teaching agricultural skills in colleges of education.

Discussion of Major Findings

The study revealed that the project teaching approach has a significant effect on students' acquisition of agricultural skills in colleges of education. This was shown in Table 1, where the post-test mean score (20.16) for students taught using the project teaching approach is greater than their pretest mean score (8.04). The t-test analysis result in Table 4 also showed that the project teaching approach had a significant effect on students' acquisition of agricultural skills in colleges of education, as the t-calculated (14.78) was greater than the t-critical value (2.09) at the .05 level of significance. This finding agrees with Binnie (2002), who found that the use of a project teaching approach was very helpful in assisting the learning of students. Their active involvement in the tasks motivates them to think and enhances their learning. Edmond and Ayodele (2014) also found that the project's instructional approach was more effective in enhancing the performance of students. Udofia and Aniefiok (2013) further concluded that the project teaching approach facilitates students' skill acquisition.

Table 2 revealed that the post-test mean score (16.32) of students taught using a demonstration teaching approach is greater than their pretest mean score (8.40). The t-calculated (9.93) on table 5 was also greater than the t-critical value of 2.09 at the .05 level of significance. This therefore means that the demonstration teaching approach has an effect on students' acquisition of agricultural skills. This finding is supported by Ogologo and Wagbara (2013), as they reported that the demonstration teaching approach has an effect on students' academic achievement. Amoah (2009) also found that the demonstration teaching approach was effective in teaching practical agricultural science.

Table 3 presents the mean score of 20.16 and standard deviation (2.85) of students exposed to the project teaching approach, which was higher than the mean score of 16.32 and standard deviation (2.82) of students

exposed to the demonstration teaching approach. The finding revealed that the project teaching approach was more effective than the demonstration teaching approach in enhancing students' acquisition of agricultural skills. The t-test analysis in Table 6 showed a significant difference in the students' acquisition of agricultural skills when taught using the project teaching approach and the demonstration teaching approach. The analysis revealed the t-calculated value of 4.89, which was greater than the t-critical value of 1.96 at the .05 level of significance. This implies that the project teaching approach was more effective than the demonstration teaching approach in students' acquisition of agricultural skills. This finding agreed with Duruji *et al.* (2014)'s work, which reported that more participatory teaching stimulates imaginative and conceptual thinking amongst students and has a positive in their performance. Udofia and Aniefiok (2013) also found that the project teaching approach facilitates students' skill acquisition. Nsa (2002) experimented on demonstration and project methods on secondary school students' acquisition of production skills using t-test and mean statistics, and reported that the project teaching method was more effective than the demonstration teaching method. Edmond and Ayodele (2014), in their research with building construction students, found that the project instructional approach was better in enhancing students' academic achievement. However, this finding disagreed with Amoah (2009), who found that the demonstration teaching approach was better than the project approach in teaching practical skills in agricultural science. Though it was a perception study and the result may likely be that the students responded based on their preference for the teaching approaches instead of the learning outcome.

Conclusion

Based on the findings of the study, the following conclusions have been made:

1. Project and demonstration teaching approaches are effective in teaching agricultural skills in colleges of education and can facilitate the acquisition of agricultural skills among students.
2. The project teaching approach is more effective than the demonstration teaching approach in teaching agricultural education in colleges of education.
3. Project and demonstration teaching approaches can be concurrently used in teaching skill areas in agricultural education in colleges of education.
4. Vocational agricultural skill acquisition among agricultural education students can actually be enhanced if project and demonstration teaching approaches are used to teach in colleges of education.

Recommendations

Based on the findings and conclusions of the study, the following recommendations have been considered necessary:

1. Agricultural education curriculum planners should review the colleges of education's NCE Curriculum to emphasise the importance of using project and demonstration teaching approaches by teachers in the colleges.
2. The project teaching approach should be properly adopted by agricultural education teachers as the main instructional approach to teaching agricultural skills in colleges of education.
3. Agricultural education teachers in the colleges should be discouraged from using the conventional teaching approach (lecture approach) in teaching.
4. Agricultural education students should be encouraged to approach learning agriculture as a vocation for livelihood. This is to enhance active participation and also discourage the mindset that practical learning is stressful.
5. There is a need for federal and state ministries of education to interphase with the ministries of agriculture in equipping the agricultural education departments in the colleges with adequate facilities required for vocational agricultural training.

6. There should be provision for compulsory teacher training and retraining for agricultural education teachers by institutions of learning for them to be effective in their work using practical-oriented instructional approaches.
7. For effective acquisition of agricultural skills, the teaching of agriculture at the colleges of education should be 70% on-the-farm-training and 30% classroom work in order to achieve the self-reliance target of the national goal of vocational and technical education.

References

Achuonye, K. A. A. (2002). Cognitive/learning styles: Implications for effective technical education in Nigeria. In C. C. Asagwara (Ed.), *Readings in applied psychology* (p. 17).

Akorede, S. N., Abdulfatah, H. A., Aliyu, M., & Alapa, J. O. (2019). Effects of reproductive health education intervention on sexual choices of female undergraduates of University of Ilorin. *Journal of Physical Education Research, 6*(2), 50–55. http://www.joper.org/JOPER/JOPERVolume6_Issue2_4_6_2019_182.pdf

Amoah, E. K. (2009). *The act of teaching agricultural science in the junior high school: The case of Assin District in the Central Region* (Master's dissertation). University of Cape Coast.

Auwal, A. (2013). Effects of teaching methods on retention of agricultural science knowledge in senior secondary schools of Bauchi Local Government Area, Nigeria. *International Journal of Science and Technology Education Research, 4*(4), 63–69.

Binnie, N. S. (2002). *Neil Binnie's statistics resources*. Auckland University of Technology. http://www.aut.ac.nz/depts./stats

Biu, A. A., Akorede, A. A., & Isiaq, A. T. (2025). Effect of health education intervention programs on emergency contraceptives awareness among university undergraduate female students in Jigawa State, Nigeria. *Zamfara International Journal of Education, 5*(3), 258–265. https://doi.org/10.64348/zije.202565

Bruce, C. D., John, R., Tara, F., & Rich, M. (2009). Lesson study and demonstration classrooms: Examining the effects of two models of teacher professional development. Retrieved from http://google.com/scholar?

Chard, S. (2004). *Project approach in early childhood and elementary education*. http://www.projectapproach.com

Daluba, N. E. (2013). Effect of demonstration method of teaching on students' achievement in agricultural science. *World Journal of Education, 3*(6). http://www.sciedu.ca/wje

Duch, B. (2002). *Problem-based learning*. University of Delaware. http://www.udel.edu/pbl

Duruji, M., Azuh, D., Segun, J., Olarenwaju, I. P., & Okorie, U. (2014). Teaching methods and assimilation of students in tertiary institutions: A study of Covenant University, Nigeria. In *Proceedings of EDULEARN 14 Conference* (pp. 5116–5126). Barcelona, Spain.

Edmond, A. O., & Ayodele, O. (2014). Effect of project instructional approach on the achievement of building construction students in technical colleges in Ogun State, Nigeria. *Global Journal for Research Analysis, 3*(5), 35–38.

Edu, D. O., Ayang, E., & Idaka, I. (2012). Evaluation of instructional methods and aptitude effects on the psychomotor performance in basic electricity among technical students in southern educational zone, Cross River State, Nigeria. *American International Journal of Contemporary Research, 2*(2), 117–123.

Eloebhose, F. E., & Uhumuavbi, P. O. (2002). Learning spiral model and STM andragogical model for building a sustainable development lesson. In *STAN Proceedings of the 43rd Annual Conference and Inaugural Conference of CASTME Africa*. Heinemann Educational Books Plc.

Federal Republic of Nigeria. (2004). *National policy on education* (4th ed.). NERC Press.

Ganyaupfu, M. E. (2013). Teaching methods and students' academic performance. *International Journal of Humanities and Social Science Invention, 2*(9), 29–35. http://www.ijhssi.org

Hadim, H. A., & Esche, S. K. (2002). Enhancing the engineering curriculum through project-based learning. In *32nd ASEE/IEEE Frontiers in Education Conference*. IEEE Press.

Katz, L., & Helm, H. J. (2001). *Young investigators: The project approach in the early years*. Teachers College Press.

Kothari, R. C. (2004). *Research methodology: Methods and techniques*. New Age International Publishers.

Nsa, E. O. (2002). Effects of demonstration and project methods on senior secondary students' skill acquisition in vegetable production. *Journal of Education Innovations, 1*(1), 95–97.

Nsa, S. O., Akpan, E. O., & Williams, P. S. (2012). Instructional strategies and students' skill acquisition in vegetable crops production. *Pakistan Journal of Business and Economic Review, 3*(1).

Ogologo, G. A., & Wagbara, S. (2013). Effect of demonstration strategy on senior secondary school students' achievement in separation techniques in chemistry in Obio/Akpor Local Government Area, Rivers State. *Journal of Vocational Education and Technology, 10*(1–2), 15–29.

Prpic, J. K., & Hadkraft, R. G. (2009). What is problem-based learning? http://www.dlsbweb.rmit.edu.au/eng/beng0001/learning/strategy

Rao, V. K. (2004). *Higher education*. APH Publishing Corporation.

Roberts, G. T., & Harlin, F. J. (2007). The project method in agricultural education: Then and now. *Journal of Agricultural Education, 48*(3), 46–56.

Sola, O. A., & Oloyede, E. O. (2007). Effects of project, inquiry and lecture-demonstration teaching methods on senior secondary students' achievement in separation of mixtures practical test. *Educational Research and Review, 2*(6), 124–132.

Udofia, N., & Aniefiok, E. U. (2013). Project and e-learning teaching methods and students' skills acquisition in electrical installation works in technical colleges in Akwa Ibom State. *Academic Journal of Interdisciplinary Studies, 2*(2). MCSER-CEMAS, Sapienza University.

Uhumuavbi, J. A., & Mamudu, J. A. (2009). Relative effect of programmed instruction and demonstration methods on students' academic performance in science. *College Students Journal, 4*(3), 45–58.

VanPatten, B., & Bennati, A. G. (2010). *Key terms in second language acquisition*. Continuum International Publishing Group.