

**Agricultural Education Pedagogy and Skill Acquisition by Students in Crop Production Technology****Archibong, Catherine Alfred & Etim, Grace Johnson**

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Abstract

The purpose of the study was to establish the agricultural education pedagogy employed by teachers to enhance students' acquisition of skills in crop production. The study access the concept of Agricultural Education, concepts of pedagogical approaches in Agricultural Education, skills and skills acquisition, modern techniques in crop production. It was concluded that methods such as demonstration, experimental, tours, and field trips should be used by teachers for the students to acquire knowledge and skills in crop production and it was also recommended that modern technologies like autopilot, biotechnology and crop sensors should be provided by the Federal Government in each ADPS centres in the states for agricultural education students to used it during tours and field trips.

Key words: Agricultural Education Pedagogy, Skills Acquisition, and Crop Production Technology.

Introduction

The teaching and learning of agricultural science includes learning subjects, legislation, agricultural basic knowledge, ecological and biological systems, problem solving, understanding and developing formulae's in agricultural concepts and observation events. For this reason, the agricultural teacher must use the appropriate pedagogical method to allow a better understanding and learning of a particular agricultural content or event as a task. It is crucial to teach the agricultural events with basic scientific concepts, as detailed, annotatively and answering the questions of students properly with getting satisfaction from them. However, learners usually prefer memorizing agricultural knowledge that need analytical thinking and essential notion since these information's have presented to trainers or learners in theoretical way rather than tangible instrument (Darko , Offei-Ansah Shouqi , Jun-Ping & Liu 2015).

Teaching methods according to Hassan (2006) are the approaches, ways and strategies that a teacher adopts in conducting his lesson to a successful end. Mamman (2002) also defines teaching methods as the ways of teaching which involve a series of teacher directed activities that result into pupils' learning. Teaching methods comprise of principles and strategies used for instruction (Daluba, 2013). Teaching methods are the tools of the teacher for reaching the setgoals and objectives.

Concept of Agricultural Education

Agricultural education is a type of vocational training involving the equipping of the learners with the knowledge and skills involved in productive agriculture. It involves the training of both the head and the hands of the learners. A learner is equipped with both the educational and agricultural knowledge (i.e. the development of the three domains; cognitive, affective and psychomotor). Agricultural education entails the use of scientific knowledge in the teaching and learning of food production through the acquisition of knowledge of crop production, livestock management, soil and water conservation and other associated benefits for industrial and human development. It is a type of vocation that emphasizes preparation and participation in an occupation for social value (Odogwu, 2005). Contrary to general education, it is skill-oriented. Apart from being trained as a teacher agricultural education also prepares individual for self-reliance and job creation.

Vocational agricultural education is concerned with the development of skills; knowledge and attitude in the field of agriculture to enable the recipients take up a career in it. It is responsible for preparing individuals in various agricultural occupations such as those concerned with growing crops, rearing animals, providing ornamental horticulture, managing farm business and managing farm resources (Ezeagu and Ezema, 2004).

Concepts of Pedagogical Approaches in Agricultural Education

Concept Mapping

A concept map is a type of graphic organizer used to help students organize and represent knowledge of a subject. Concept maps begin with a main idea (or concept) and then branch out to show how that main idea can be broken down into specific topics. Concept maps are typically hierarchical, with the subordinate concepts stemming from the main concept or idea. This type of graphic organizer however, always allows change and new concepts to be added. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts indicated by a connecting line linking two concepts. According to Ahmed (2010), a concept map is a diagram showing the relationships among concepts. It is a graphical tool for organizing and representing knowledge.

The concept map representation encodes propositions describing two or more concepts and their relationships, in implied natural language sentences. In educational settings, concept mapping exercises have been used to encourage students to actively construct an understanding of concepts and relationships within domains of interest (Ahmad, 2013). John (2015) added that, concept mapping is a valuable theory of learning that teachers can use to evaluate a student's level of understanding.

Lecture Method

Lectures usually take place in a classroom-format and are a common strategy teachers employ in the teaching of agriculture. It is also referred to as talk and chalk or textbook method, the teacher dominates the teaching with very little participation on the part of the learners (Umar, 2012). Here the teacher is seen as the repository of all knowledge while the students are passive recipients of knowledge transmitted by the teachers in the learning

process. The method has the advantage of covering a wider area within a short time but it is not student centered and students do not gain mastery of concepts (Umar, 2012). Studies have outlined the major advantage of lecture method as the ability to get a huge amount of information to a lot of people in a short amount of time (Charlton, 2006).

In the context of the current study, this method is the least effective in developing agricultural skills for crop production, lectures contain no form of interaction from the teacher to the student and can be quite boring (Seevers & Graham, 2012). Studies show that people only retain 20 percent of what they are taught in a lecture (Charlton, 2006). According to Seevers & Graham (2012) lectures are only useful when used in a conscious way. Properly structured-lectures may be the best teaching method for many subjects and many students, and lectures may be especially well-suited to the transmission of conceptual and systematic knowledge (Charlton, 2006). In a study (Umar, 2012) indicated that a large amount of the topic can be covered in a single class period, use of this method exclude the use of any equipment or laboratory, learning material is not required, student listening skills developed, there is logical arrangement of the material in order to present it orally and helps to learn languages.

Umar, (2012) outlines the disadvantages of lecture method of teaching as teachers delivering the same lecture to students without recognizing the individual differences; language use in the lecture is above the standard of the students hence they are not able to get full advantage of the lecture. Lectures are often forgotten by the students soon after while learning is retained if activities are experienced and attention level is not the same for students listening to the lecturer (Umar, 2012). Lectures are therefore usually the best medium for teaching up to the point where the student begins to specialize and train as a practicing scientist, at which point a more individualized and skill orientated apprenticeship becomes necessary (Charlton, 2006). The method would be the least appropriate for teaching agricultural education students crop production due to the lack of its ability to develop psychomotor skills.

Discussion Method

Using discussions as a primary teaching method in agriculture allows the teacher to stimulate critical thinking on the learners (Umar, 2012). This approach also helps the teacher to establish a rapport with the students; demonstrate an appreciation of their contributions at the same time challenging them to think more deeply and to articulate their ideas more clearly. The frequent questions asked by both the teacher and the students provide a means of measuring learning and exploring in-depth the key concepts of the course, through discussion method, a set of acquired skills that is necessary for establishing and developing interpersonal relationships such as communication skills, cooperation, emotional intelligence are developed (Seevers & Graham, 2012).

Tours and Field Trips

Tours are series of field and demonstration meetings arranged in a logical sequence (Seevers and Graham, 2012). A tour may be devoted to a specific topic or the cumulative effect of several result demonstrations (Seevers & Graham, 2012). The usual purpose of outdoor training through tours and fieldtrips is to develop teamwork skills (Umar, 2012). Agricultural students can benefit from such experiences by employing the team spirit in school-based and community projects. A key benefit in fieldtrip learning is the transfer of knowledge between students (Goh, 2011). Students with prior experiences share their knowledge with other students and the experiences serves to connect the group (Goh, 2011). Studies (Goh, 2011; Wong, 2008) reported that fieldtrips enhanced students' learning and increased their practical knowledge, acquisition of skills and competencies in crop production.

Experimental Method

Experiential learning emphasizes the role that experience plays in the learning process, and emphasis that differentiates it from other learning theories. It defines learning as the process whereby knowledge is created through the transformation of experience (Kolb, 1984). Constructivist theory by Dewey (1998) fits in this approach because of the endless experiences learnt from the farm. Students are reconnected to local agriculture so that farms are no longer an abstract notion, they developed hands-on experience so that children can truly understand with all their senses just what it means to be on a farm (Goh, 2011). The incorporation of this approach through creation of adequate time and ensuring it becomes part of the project work done in the farm for crop production students to gain more seriousness as it is being carried out.

Demonstration Method

Demonstration method refers to the type of teaching method in which the teacher is the principal actor while the learners watch with the intention to act later. Here the teacher does whatever the learners are expected to do at the end of the lesson by showing them how to do it and explaining the step-by-step process to them (Ameh, Daniel & Akus, 2007). The demonstration may include diagrams, charts, and other illustrative material accompanied by an oral explanation (Seevers & Graham, 2012). The audience observes the process, listen to the explanation, and pose questions during or at the conclusion of the demonstration (Seevers & Graham, 2012). Such procedures may include machine used for spraying fertilizers, herbicides, insecticides and fungicides on crops, how to graft a mango tree or how to install drip irrigation in a home garden, how to operate tractors machines, plough machines and ridgers. This incorporation of demonstration improves both recall and psychomotor skills when the students are allowed to repeat the same procedures either individually or as groups. (Adofu, Abula, & Agama, 2012).

Class Projects

Agricultural projects seek to improve crop production for food security by diversifying a household's resource base and facilitating the social and economic empowerment of women (Walingo, 2018). Several methods of classifying projects have been put in place; one approach has been to classify projects based on the purpose or outcomes while another approach has been to classify projects based on the actions of the learners rather than project outcomes

(Roberts, 2007). The project method is a teacher-facilitated collaborative approach in which students acquire and apply knowledge and skills to define and solve realistic problems using a process of extended inquiry (Howell, 2003). Class projects are therefore student-centered, following standards, parameters, and milestones clearly identified by the teacher. Project teaching method is based on the conviction that learning by doing, discussing in groups, and revisiting ideas and experiences are superior ways of gaining a better understanding of one's environment (Diise, 2018). According to existing literature, practical work through class projects makes learning more enjoyable (Osborne and Collins, 2001; Jenkins & Nelson, 2005; Toplis, 2012).

Class projects as an important part of an agricultural education that provides application of concepts taught in class. Students can hence transfer the acquired skills to their homes. For instance skills in breaking seed dormancy can be done in school and the student does the same when establishing a mango tree nursery which is an indication of sustainable food availability even for future generations. However, the purposes of projects in agricultural education have expanded beyond skill acquisition and proficiency to include personal development for diverse career preparation beyond agriculture (Roberts, 2007).

Problem Solving Approach

The problem solving approach is a student-centered approach to teaching where students participate in the learning process by contributing problems, analyzing the factors associated with the problems, developing possible solutions to the problems, placing the solution(s) into action, and evaluating the results of the solution (Olowa, 2009).

Problem-Based Learning

Problem-based learning (PBL) is a constructivist approach to instruction that revolves around a real world, ill-structured problem (Burris & Garton, 2006). PBL promotes both the acquisition of content knowledge and the development of thinking skills and strategies.

Discovery Method

Discovery method has been found to improve student motivation and interest (Herman & Knobloch, 2004; Gordon, Rogers, Comfort, Gavula, & Mcgee, 2001; Norman and Schmidt, 1992). Students also indicate more satisfaction with probe based learning than with traditional methods of instruction (Ball & Donaldson, 2000; Albanese and Mitchell, 1993; Vernon & Blake, 1993). However, controversy on the use of this approach is the existence of little empirical evidence as to what students are learning and how (Olowa, 2009; Hmelo-Silver, 2004; Dyer & Osborne, 1999).

Modern Crop Production Technologies in Agriculture

The followings are the modern crop production technologies by DeJanvry and Sadoulet, (2002).

Autopilot Tractors: New global positioning system GPS tractors and sprayers machines can accurately drive themselves through the mentioned field without drivers. On the board of computer system, a user has told how wide a path a given piece of equipment will cover he will drive a short distance setting A and B points to make a line. The GPS system will have a track to follow and it extrapolates that line into parallel lines set apart by the width of the tool in use. The tracking system is tied to the tractor's steering, automatically keeping it on track

freeing the operator from driving. This allows the operator to keep a closer eye on other things. Guidance is made great for tillage because it removes human error from overlap, saving fuel and equipment hours.

Crop Sensors: Crop sensors are going to help farmers apply fertilizer in a very effective manner, maximizing uptake. Sensing how your crop is feeling and reducing potential leaching and runoff into ground water. This is taking variable rate technology to the next level. Instead of making a prescription fertilizer map for a field before you go out to apply it, crop sensors tell application equipment how much to apply in real time. Optical sensors are able to see how much fertilizer a plant may need based monitors on the amount of light reflected back to the sensor.

Biotechnology: Biotechnology or genetic engineering (GE) is not new technology, but it is an important technology with much more potential yet to be unleashed. The form of genetic engineering, most of the people have probably heard of is herbicide resistance. Crops can be made to express toxins that control particular pests. Many employ toxin that is the same toxin found in some organic pesticides. It means a farmer won't have to make a pass through his field to apply pesticide, which is not only saves on pesticide, but labour, fuel and wear on equipment too. There is another way to look at it would be that farmers who irrigate their crops can cut back on water use and not see yields suffer. Nitrogen use efficiency is a lot like that except you're doing it with fertilizer instead of water.

Monitoring and Controlling Crop Irrigation Systems via Smartphone:

Mobile technology is playing an important role in monitoring and controlling crop irrigation systems. With this modern technology, a farmer can control his irrigation systems from a phone or computer instead of driving to each field. Moisture sensors in the ground are able to communicate information about the level of moisture present at certain depths in the soil. This increased flexibility allows for more precise control of water and other inputs like fertilizer that applied by irrigation pivots. Farmers can also combine this with other technology like VRT to control the rate of water applied. It's all about more effective and efficient use of resources.

Concept of Skills and Skill Acquisition

Skills have to do with once ability to perform or manipulate an activity that is related to meaning exercise (Chisholm, 2003). Hornby, (2006), defines skills as an ability to perform well in a given job. Okorie, (2006), opined that skill is acquired when theoretical knowledge is translated into practical activities. Okorie (2000) defines skill as expertness, practical ability, dexterity and tact, an organized sequence of actions, proficiency executed and usually displayed in flexible but, systematic temporal pattern. Here the author viewed skills as manual dexterity through repetitive performance of an operation or task. Elijah (2006) described skills as a well-established habit of carrying out a task; it involves the acquisition of performance capability. To acquire a skill is to acquire habit of acting, thinking and behaving in a specific pattern, in such a way that the process becomes natural to the individual through repetition and practice.

Osinem & Nwoji, (2010), posited that skills are the practical ability or proficiency displayed in the performance of task. Osinem, (2008) pointed out that, for skill to be acquired theoretical knowledge and practical activities must be fully integrated into teaching, learning process effectively Egbule, (2012) opines that acquisition of skills in agricultural production by youths is desirable to drive the Nation's economy forward. Albert, Nnodim, & Cookey (2012) stated that acquisition of skills is the process of facilitating the development of a novice into an expert. Skill acquisition in this study is the process whereby agricultural students are exposed directly to both practicals work in the farm to acquired skills in crop production technology directly to both classroom instructions and field experience in order to achieve a complete and productive education.

Conclusion

The study on the agricultural education pedagogy established the agricultural teaching approaches employed by teachers in the teaching and learning in crop production and the modern technologies used in crop production with ease. This is to enhance relevant skills development for increase crop production in the country. Practical based approaches need to be incorporated to enhance acquisition of knowledge.

Recommendations

1. It was recommended that agricultural education teachers should enable to apply the above teaching methods for the student to acquired knowledge and skills in crop production.
2. The modern agricultural equipment mentioned in this should be provided in each state in the Agricultural Development Projects Centres ADPS for student to be visited during their tours and field trips for the student to acquire skills.

References

- Adofu, I; Abula, M. & Agama, J.E. (2012). The effects of Government Budgeting Allocation to Agricultural output in Nigeria. *Sky Journal of Agricultural Research*, 1(1): 1-5
- Ahmad, B. C. & Munawar, S. M. (2013). Effect of Concept Mapping On Students' Academic Achievement. *Journal of Research and Reflections in Education*, 7 (2): 125 -132.
- Albanese, M. A. & Mitchell, S. (1993). Problem-Based Learning: A Review of Literature on its Outcomes and Implementation Issues. *Academic Medicine*, 68, P. 52-81.
- Albert, C.O., Nnodim, A.U., & Cookey, A.T. (2013). Analysis of skills acquisition programme (SAP) on employment opportunities in rural Rivers State. *Journal of Research on Humanities and Social Sciences*, 3 (9) : 106-109.
- Ameh, I. E., Daniel, B. P. & Akus, Y. (2007). *Research and methods in the social sciences*. Ankpa: Rowis Press
- .Egbule, J. F. (2012). Use of new information and communication technology innovation. Retrieved on 20 November 2015; from <http://www.globalacademicgroup.com>.

- Ball, A. L., & Knobloch, N. A. (2004). an exploration of the outcomes of utilizing ill-structured problems in pre-service teacher preparation. *Journal of Agricultural Education*. 45 (2): 62-71.
- Burris, S. & Garton, B. L. (2006). Problem-Based Learning in secondary agriculture classroom: effect on critical thinking and content knowledge. Retrieved on 8th April, 2019 from <https://www.researchgate.net>.
- Charlton, B.G. (2006). Lectures are such an effective teaching method because they exploit evolved human psychology to improve learning. *MEd hypotheses*, 67(6):1261-1474. Doi: [10.1016/J.Mehy.2006.08.001](https://doi.org/10.1016/J.Mehy.2006.08.001).
- Chisholm, L. (2003). *Vocational skill and biotechnology manufacturing* Cambridge. Cambridge University Press.
- Cockrell, K. S., Caplow, J. A. & Donaldson, J. F. (2000). *A Context for Learning: Collaborative*.
- Daluba, N. E. (2013). Effect of demonstration method of teaching on students' achievement in agricultural Science. *World Journal of Education*, 3(6):130-138.
- Darko R. O, Offei-Ansah C, Shouqi Y, & Jun-Ping LIU (2015). Challenges in the teaching and learning of agricultural science in selected public senior high schools in the Cape Coast Metropolis. *Agricultural Science*, 3 (1):13-20.
- De Janvry, A. & Sadoulet, E. (2002) World poverty and the role of agricultural technology. direct and indirect effects". *Journal of Development Studies*, 38 (4): 1-26.
- Dewey, J. (1998). *How we think*. Mineola, New York: Dover Publications, Inc.
- Diise A.I., Mohammed, A. A. & Zakaria, H. (2018). Organizing project method of teaching for effective agricultural knowledge and skills acquisition: comparison of individual and group student projects. *Journal of Education and Practice*.9 (23), 35-49.
- Dyer, J. E & Osborne, E. (1999). Effects of Student Learning Style on Short and Long-Term Retention of Subject Matter Using Various Teaching Approaches. *Journal of Agricultural Education*. 5 (40) 25-39
- Ezeagu, S. E. & Ezema, P. N. (2004) *Introduction to vocational education*. Enugu: OZyBEL Publishers. Pp. 32.
- Groups in the Problem-Based Learning Environment. *The Review of Higher Education*, 23 (3): 347- 363.
- Goh, A. H. (2011).The value and benefits of fieldtrips in tourism and hospitality education. *Higher Learning Research Communications* 1, (1) 45-59

- Gordon, R. R., Rogers, A. M., Comfort, M., Gavula, N., & Mcgee, B.P. (2001). A taste of problem-based learning increases achievement in urban minority middle-school students. *Educational Horizons*, 79 (4): 171-175.
- Hassan, B. (2006). Qualitative technical teacher education as a strategy for technology development. *International Journal Social and Policy* 4 (1&2).
- Herman, J. M., & Knobloch, N. A. (2004). Exploring the effects of constructivist teaching on students' attitudes and performance. *Proceedings from the 2nd Annual North Central Region*.
- Hmelo-Silver, C. E. (2004). Problem-Based Learning: what and how do students learn? *Education Psychology Review*, 16 (3): 235-265.
- Hornby, A. S. (2001). Oxford learner's dictionary of current English. London: Oxford University Press
- Howell, R. T. (2003). The importance of the project method in technology education. *Journal of Industrial Teacher Education*. 40, (3) 61-72.
- Kolb, D. A. (1984). *Experiential learning: experience as the source of learning and development*. Upper Saddle River, NJ: Prentice Hall.
- Mary, M. S. (2002). *Teaching methods and techniques. Yola: paraclete sangita effects of concept mapping method on the academic Performance of Agricultural Science in Senior Secondary Schools in Kaduna State*
- Norman, G.R., & Schmidt, H.G. (1992). The Psychological Basis of Problem-Based Learning: A Review of the Evidence. *Academic Medicine*, 6 (7), 557-565.
- Odugwu, A. G. (2005) *An introduction to vocational and technical education In Nigerian schools and colleges*, Owerri- Nigeria wisdom people publishers.
- Okorie, J. U. (2000). "Developing Nigeria's workforce" Calabar, Nigeria. Monkey Environs Publishers
- Olowa, O.W. (2009). Effects of the problem solving and subject matter approaches on the problem solving ability of secondary school agricultural education. *Journal of Industrial Teacher Education*, 46, (1) 34-49.
- Osinem, C. and Nwoji, U. C. (2010), *Students Industrial Work Experience in Nigeria Concepts, principles and practice*: Enugu: Cheston Agency Ltd.
- Osinem, E. C. (2008). *Managing agricultural education and training, resources, principles and methods*. Enugu Belong International Publishers 116-138.
- Osborne, E. W. (2007) National research agenda: agricultural education and communication. Gainesville: *American Association for Agricultural Education*. 5 (6) 56-69



Roberts, B. N. (2007). Contextualizing personality psychology. *Journal of Personality*, 75, (6) 1071-1082

Seevers, B., & Graham, D. (2012). Education through cooperative extension. (3rd Ed.). Fayetteville, Ar: University of Arkansas Bookstore.

Umar, F. (2012). Lecture method of teaching, definition, advantages & disadvantages. Retrieved from www.study lecture notes. 10th April, 2019.

Vernon, D T., and Blake, R. L. (1992). Does problem-based learning work? a meta-analysis of evaluative research. *Academic Medicine*, 68(7), 550-563.

Walingo. (2018). The Role of education in agriculture projects for food security and poverty reduction in Kenya. *International Review of Education*. Switzerland: Springer.

Wong, A. & Wong, S. (2008). Useful practices for organizing a field trip that enhances learning. *Journal of Teaching in Travel and Tourism*, 8(2-3), 241-260.