



Assessing the Perception of Pre-Service Teachers on Teaching and Learning of Agriculture in Colleges of Education in Ghana

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

This study sought to examine the effectiveness of teaching and learning of agriculture among pre-service teachers, including the challenges facing the teaching and learning of agriculture among students in the colleges of education in Ghana. A survey design with a quantitative data was gathered for the study. Stratified sampling method was used to select respondents in Ashanti and Western North regions. The data collected were analysed using descriptive statistics. The findings revealed that 70% of the pre-service agriculture students hold the view that the teaching and learning is not effective among the students in the colleges. The study again identified the challenges that militate against teaching and learning of agriculture. The challenges were inadequate tools and equipment, lack of resourceful libraries and laboratories, insufficient time to complete the curriculum, lack of proper school farms/gardens, poorly committed teachers and too little practical work. It is recommended that heads of colleges of education are to focus on the challenges causing ineffective teaching and learning to improve teaching and learning while revising the existing agriculture curriculum.

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1. INTRODUCTION

Every nation can advance if its people have access to quality education. Agricultural education is crucial for agricultural growth because it offers a platform for the knowledge and skill-building of the labor force in the agricultural industry. Additionally, it is essential to a nation's development, especially in rural areas where the bulk of people depend on agriculture for a living [1,2].

The colleges of education prepares pre-service teachers and produce instructors for elementary educational institutions as well as labour for the advancement of the nation and the workforce. Given the significance of agriculture to the economy, agriculture was included as a subject to Ghana's educational system to meet the demands of the nation's expanding economy. Successive national and local governments in Ghana have been investing a sizeable portion of their annual budget to the education sector due to the significance of manpower development in the quality of academic attainment. Additionally, parents also work hard to ensure that their kids do well in all subjects including Agricultural science in school by providing them with all the necessary emotional and monetary support [3].

Agricultural science is a program offered in the colleges of education in Ghana, as a vocational subject. It cannot be taught effectively without the use of suitable teaching resources; it must be taught thoroughly to achieve both educational and economic goals. In order to meet the demands of changing global world [4,5]. Ghana's education reforms have made it a priority to produce good quality teachers and this development is the focal point of their plan to raise educational standards and learning results [6,7]. In order to produce skilled graduates and human capital to support the development of the human resource, students must achieve a high level of academic performance.

Effective teaching and learning are significantly independent on instructional strategies by the traditional teacher-centered approach (lecture-based instruction) used by the majority of teachers in Ghana [8]. According to research, teachers' incompetence and improper treatment of the topics may lead to students' lack of understanding in the majority of subjects taught in general [9,10,11]. In view of Fasasi [11], the

teacher's instructional practices have an effect on the cognitive, emotional, and psychomotor outcomes of the students. To ensure that students fully comprehend and acquire a particular learning activity, it is crucial for the teacher to employ the right pedagogy. It is crucial to remember that certain areas of agricultural science, such as the comprehension of fundamental scientific ideas and the solution of problems based on observed phenomena, call for a strong understanding as well as explanatory and problem-solving skills from the student in question.

However, Resmicks [12] believes that students tend to recall concepts that require analytical thinking and basic knowledge in the concept concerned due to the subject been more theoretical than practical. The memorization of facts, rules, and regulations often results in learning not occurring since the information is not integrated in a cohesive framework that would enable students to make sense of it. Therefore, it is crucial for any professional teacher to understand what decisions to make, when to make them, and how those decisions will affect the teaching-learning experience. Teaching is given a professional touch by these choices, which offer the interactions in the classroom direction, purpose, meaning, and structure.

With the introduction of the Bachelor of Education programs in the colleges of education in Ghana since 2018, little or no specific study has been conducted to assess the teaching and learning of agricultural science. Therefore, this paper examines the perception of pre-service teachers on effectiveness of teaching and learning of agriculture among pre-service teachers including the challenges facing the teaching and learning of Agricultural science in the colleges of education. The following research questions guided the study:

1. What is the level of effectiveness in the teaching and learning of agriculture in the colleges of education?
2. What are the challenges affecting the teaching and learning of agricultural science in the colleges of education?

2. LITERATURE REVIEW

Since agriculture is a practical subject, it should be taught using hands-on activities that involve

student engagement. After receiving instruction, the students must have the flexibility to independently acquire new skills and knowledge. To accommodate different learning styles and abilities, teachers should employ a learner-centered approach. As children learn by doing rather than being told, this suggests that the teaching and learning of agriculture should be grounded in the constructivist theory [13], which holds that people actively participate in creating their own knowledge about their experiences and surroundings [14]. In the view of constructivists, students learn by building new concepts on the foundation of their prior knowledge. However, they also contend that because each learner possesses a distinct set of mental faculties that they employ to make sense of every event and circumstance, every individual is unique in the way they learn, see the world, and process information. According to this theory, research projects, problem-solving, brainstorming, cooperative learning or group learning, and discovery learning are some potential applications of constructivism in teaching and learning [15], and these make up a pool of approaches that can be used when teaching agriculture to help students perform well. Dewett [16] mentioned that good teachers are constantly on the alert for methods and instructional materials that will make learning meaningful.

All teacher training programs make an effort to get future educators ready to teach agriculture. Unfortunately, there is limited consensus among teacher educators over the precise courses and internships needed to prepare teachers for success [17]. In the view of Young [18] the characteristics of ineffective teachers included inconsistent management, discipline issues, lack of attention, unstructured classes, a preference for highly structured instruction, maintaining a distance from pupils, and taking a passive rather than active role in the classroom. This can lead to the decline of students' performance in schools. The academic performance of a student, which is typically measured in terms of scores and grades earned, largely determines that learner's success. Academic performance, which measures a student's aptitude for a task, is regarded as the primary criterion for evaluating their achievement, potential, and capabilities. Thus, a student's scores and grades serve as a gauge of their level of academic performance. Poor student performance in agriculture may have an impact on the socioeconomic development of the nation; it may cause students

to fail their entire school examination, which may then result in unemployment, a negative attitude toward agriculture [19], a reluctance to enroll in the subject, a decline in the number of young people choosing to study agriculture, and a detrimental impact on the nation's economy [1,20].

However, according to Suydam [21], for effective teaching and learning to occur, teachers must show concern about students' academic progress by showing support, encouraging their participation in class through questions and discussions, minimizing time wasting, establishing and adhering to clear classroom rules, closely observing students' behavior, moving around the room, and giving clear instructions. In an effective teaching and learning environment, the teacher must be knowledgeable about the subject content, know students' learning, uses a range of examples, and carefully plans lessons, according to Richardson and Arundell [22]. Further studies by Miller, Kahler, and Rheault [23] identified five performance areas that were shared by effective agriculture teachers which include productive teaching behaviors (creating realistic situations and activities), structured and organized class management, positive interpersonal relationships, professional responsibilities (completing duties on time), and personal traits (displaying personality traits such as humor and patience). For effective agriculture science teaching and learning, teachers according to Foster and Finley [24] should be vested in interpersonal relationships and personal attitudes, skilled at resolving conflicts, highly motivated, committed to personal feelings, accepted by coworkers, exhibited leadership and cooperation skills, possessed good human relations techniques, and displayed good professional etiquette.

In African schools, poor educational environment such as physical facilities, resources (TLM) and teacher competency are factors that militate against effective teaching and learning of agricultural science [25,26]. There is a correlation between teaching and learning resources and students' performance [27]. The availability of educational resources enhances learners' academic achievement [28,29]. Since they facilitate more effective teaching and learning of agriculture, it is crucial that all the tools and infrastructure required for this are made available [30].

On the teaching and learning of practical agriculture, Darko et al., [31] suggested that, the absence or underfunding of school gardens, field trips, educational plots, and laboratories with adequate equipment significantly impedes the practical teaching of agricultural science. The ineffective teaching and learning of agriculture have been caused by teachers frequently using the lecture method, a lack of tools, unequipped laboratories, lack of school farms and gardens, difficulties in organizing field trips, poorly motivated teachers, and students' negative attitudes toward agriculture. Moyo and Maseko [32] stated that poor teaching methods and failure to use instructional material effectively affects teaching and learning that influence the performance of students.

3. METHODOLOGY

3.1 Research Design and Population

In this study, a descriptive research design was used for the study. The questionnaire comprised closed-ended items. A four-point Likert-type scale was used. The questionnaires had 18 items comprising of two sections. The questionnaire for soliciting responds on effectiveness of teaching and learning of agricultural science in colleges of education was multi-dimensional in nature with a Likert scale and the items were scaled using 4-point Likert scale which started with "Always = 4, More Often = 3, Occasionally = 2, and Rare = 1". Additionally, the questionnaire for soliciting responds on challenges impeding effective teaching and learning of agricultural science in the colleges of education was multi-dimensional in nature with the following responses: "Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1". The population of the research was made up of 340 Agricultural Science students selected using stratified sampling method from the colleges of education in the Western North Region of Ghana. Out of the three hundred and forty (340) students selected, three hundred and twenty (320) of them presented back the questionnaire. The response rate was 94.1% which is statistically a good return rate valid for analyses [33]. Out of the 320 agricultural science students, 65.6% (n=210) were male and 34.4% (n=110) were female.

The researcher gave a draft of the questionnaire to experts at University of Education, Winneba to check whether the items measure the intended purpose (face validity), cover all the research

questions (content validity) and the extent to which the items measure specific construct (construct validity). Prior to the study, a pilot test of the questionnaires was conducted among agricultural science students at a school outside the study area, in the western north region. After the pilot testing, Cronbach's alpha was used to estimate the reliability of students' questionnaires which gave a value of 0.78, suggesting a good reliable instruments. The results were used to correct several instrument anomalies.

3.2 Data Analysis Procedure

The frequency of each item was assessed on a point scale, and the scores were afterwards converted to percentages for discussion. All of the responses were examined using percentages and it means computed. For ease of the analyses, the respondents of Always and More Often were put together and that of Occasionally and Rare were also combined. Additionally, Strongly Agree and Agree respondents were pooled for the purposes of the analysis, as were the Strongly Disagree and Disagree respondents. Tables of frequencies, percentages and means were utilized to summarize the information gathered from the respondents. In the analysis, mean values above 2.5 ($(4+3+2+1)/=2.5$) shows that majority of the respondents agreed with the statement while a mean value below 2.5 shows that majority of the respondents disagreed with the statement.

4. RESULTS AND DATA ANALYSIS

4.1 Research Question One

What is the level of effectiveness in the teaching and learning of agriculture in the colleges of education?

Table 1 shows the respondents perception on effectiveness of teaching and learning agriculture in the colleges of education. The Table 1 indicated most important perceptions of pre-service agricultural science teachers in Ghana. The pre-service teachers perceived that; it is difficult to communicate effectively with their tutors and get faster feedback on academic matters (65.6%, n=210) with a mean of 2.16 , their tutors do not mostly use varying teaching methods, activities and resources in lesson delivery (68.4%, n=219) with a mean of 2.08, there are inadequate practical lessons from the teaching and learning indicating direct application of classroom learning (71.6%, n=229) with a

mean of 1.98, tutors' do not exhibits positive attitude toward teaching practical agriculture (75.9%, n=243) with a mean of 3.06.

These are followed by other issues like; tutors do not allow students to work together as a class with students responding to one another (70.3%, n=225) with a mean of 2.03, Learning is less interactive for me base on my relationship with my tutors (73.1%, n=234), and tutors hardly allow students to work in pairs or small groups on learning various concepts (72.8%, n=233) with a mean of 1.97.

On the other hand, the pre-service teachers have the perception that, tutors' exhibits positive attitude toward teaching the theory aspect of agriculture (72.8%, n=233) with a mean of 1.8. This shows that the respondents agreed that the teaching and learning of agriculture science have some challenge in the colleges of education.

4.2 Research Question Two

What are the challenges affecting the teaching and learning of agricultural science in the colleges of education?

Table 2 shows the respondents perceived challenges affecting the teaching and learning of agriculture science in the colleges of education. Table 2 indicated some important perceptions of pre-service agricultural science teachers in Ghana. Based on the perception of the pre-service teachers, they agreed that the following challenges affect teaching and learning of agriculture in the colleges of education; poor teaching approach of tutors (74.0%, n=237) with a mean of 3.10, inadequate tools and equipment in the schools (76.5%, n=245) with a mean of 3.00, too little practical lesson in schools (70.0%, n=224) with a mean of 3.02, lack of resourceful libraries and laboratories for agricultural science

Table 1. Pre-service teacher's perceptions on effectiveness of teaching and learning of agricultural science in the colleges of education

Statement	Always N (%)	More Often N (%)	Occasionally N (%)	Rare N (%)	Mean
Am able to communicate effectively with my tutors and get faster feedback on academic matters.	50(15.6)	60(18.8)	100(31.3)	110(34.3)	2.16
Tutors use varying teaching methods, activities and resources in lesson delivery.	46(14.4)	55(17.2)	98(30.6)	121(37.8)	2.08
There are adequate practical lessons from the teaching and learning indicating direct application of classroom learning.	40(12.5)	51(15.9)	90(28.2)	139(43.4)	1.98
Tutors' exhibits positive attitude toward teaching the theory aspect of agriculture	145(45.3)	88(27.5)	49(15.3)	38(11.9)	3.06
Tutors' exhibits positive attitude toward teaching practical agriculture.	30(9.4)	47(14.7)	82(25.6)	161(50.3)	1.83
Tutors allow students work in pairs or small groups in classrooms on learning various concepts.	49(15.3)	38(11.9)	88(27.5)	145(45.3)	1.97
Tutors allow students to work together as a class with students responding to one another.	43(13.4)	52(16.3)	97(30.3)	128(40.0)	2.03
Learning becomes interactive for me base on my relationship with my tutors.	36(11.3)	50(15.6)	90(28.1)	144(45.0)	1.93

Source: field data, 2022, (Note: < 2.50 = Most often, > 2.50 = Occasionally)

courses in schools (68.4%, n=219) with a mean of 2.92, insufficient time to complete the curriculum (70.0%, n=224) with a mean of 2.98, too much theoretical work within agricultural science courses (75.9%, n=243) with a mean of 3.17, lack of internet in the schools to search for additional learning materials (78.1%, n=250) with a mean of 3.27 and lack of proper school farms/gardens for teaching practical agriculture (75.3%, n=241) with a mean of 3.12.

On the other hand, the pre-service teachers have the perception that, the colleges of education have adequately qualified agriculture science tutors (72.2%, n=231) with a mean of 2.21 and good committed teachers (71.9%, n=230) with a mean of 2.13 as well. This indicated that the respondents agreed that there are some challenges facing the teaching and learning of agriculture science in the colleges of education.

4.3 Discussion

The results of the study revealed low level of effective interaction in the teaching and learning of agriculture science among colleges of education tutors and their students. Ineffective teaching and learning of agriculture science is characterized by seven issues which are; ineffective communication among tutors and students, tutors do not give room for students to work in pairs or small groups in classrooms, tutors do not give room for students responding to one another in a class discussion, and therefore learning becomes less interactive for students. This revelation is in tandem with Foster and Finley [24] who revealed that, for effective

teaching and learning to occur in agricultural science class, teachers must exhibit; good interpersonal relationships and personal attitudes, skills at resolving conflicts, committed to personal feelings, good public relations techniques, leadership and cooperation skills, good human relations techniques, and displayed good professional etiquette. In addition, for effective teaching and learning environment to exist, agriculture science teachers should; create realistic situations and activities, structure and organized class management, exhibit positive interpersonal relationships, complete duties on time, and displays personality traits such as humor and patience [23]. However, when these conditions are absent in the classroom hence the teaching and learning becomes ineffective.

Additionally, the ineffective teaching and learning of agriculture science was evidential in the study since tutors do not employ varying teaching methods, activities and resources in lesson delivery, tutors do not exhibit positive attitude toward teaching practical agriculture and therefore, there are inadequate practical lessons indicating non application of classroom learning. The revelation is in line with a study by Dewett [16] which mentioned that for effective teaching and learning to occur in agricultural science class, good teachers are constantly on the alert for methods and instructional materials that will make learning meaningful. With the wise selection and use of a variety of teaching methods or instructional materials or audio-visual materials, experiences may be provided to develop understanding. In a situation where these conditions are absent among the teachers

Table 2. Pre-service teacher's perceptions on challenges affecting teaching and learning of agricultural science in the colleges of education

Statement	SA N (%)	A N (%)	D N (%)	SD N (%)	Mean
Poor teaching approach	153(47.8)	84(26.2)	48(15.0)	35(10.9)	3.10
Inadequate qualified Agriculture teachers	39(12.2)	50(15.6)	171(53.4)	60(18.8)	2.21
Inadequate tools and equipment	165(51.5)	80(25.0)	45(14.1)	30(9.4)	3.00
Too little practical	144(45.0)	80(25.0)	55(17.2)	41(12.8)	3.02
Lack of resourceful libraries and laboratories	121(37.8)	98(30.6)	55(17.2)	46(14.4)	2.92
Poorly committed teachers	40(12.5)	50(15.6)	143(44.7)	87(27.2)	2.13
Insufficient time to complete the curriculum	134(41.8)	90(28.2)	53(16.6)	43(14.4)	2.98
Too much theoretical work	161(50.3)	82(25.6)	47(14.7)	30(9.4)	3.17
Lack of internet in the schools	171(53.4)	79(24.7)	45(14.1)	25(7.8)	3.24
Lack of proper school farms/gardens	154(48.1)	87(27.2)	42(13.1)	37(11.6)	3.12

Source: field data, 2022, (Note: < 2.50 = Disagreed, > 2.50 = Agreed)

therefore the teaching and learning becomes ineffective. This suggests that the teaching and learning of agriculture should be grounded in the constructivist theory [13], where students learn by doing rather than being told. This theory support application of knowledge through research projects, problem-solving, brainstorming, cooperative learning or group learning, and discovery learning [15].

The study again determined that there are challenges facing teaching and learning of agriculture science in colleges of education in Ghana. The eight most serious challenges are poor teaching approach, inadequate tools and equipment, too little practical, Lack of resourceful libraries and laboratories, insufficient time to complete the curriculum, too much theoretical work within agricultural science courses, lack of internet in the schools and lack of proper school farms/gardens. Lack of internet in the schools was the most important challenge facing teaching and learning of agriculture in the colleges of education. In the era of Information and Computer Technology (ICT), lack of accessible internet will affect student performance negatively. Islam et al., [34] reported that lack of access to internet pose a great challenge for students' academic performance.

Inadequate tools and equipment in the schools was identified as the second most important challenge affecting teaching and learning of agriculture science in the colleges of education. This finding is supported by Otekunrin et al., [30] who confirmed that agriculture involves a different type of tools and should be available for the effective teaching and learning of agriculture. Lack of proper school farms/gardens for teaching practical agriculture is another challenge facing teaching and learning of agriculture. Practical training in agriculture is rooted in the constructivist perspective that children learn by doing rather than by being told and school farms and are needed for such purpose. Darko et al. [31] explained that practical teaching of agriculture was greatly affected by lack of school farms and gardens.

Poor teaching methods are also reported as significant challenge facing effective teaching and learning agriculture science. Poor teaching methods are also related to inadequate tools and equipment in the schools. Moyo and Maseko [32] stated that poor teaching methods and failure to use instructional material effectively affects teaching and learning negatively and thereby

influencing the performance of students as well. Additionally, the results of this study again revealed that lack of resourceful libraries and laboratories is another challenge militating against effectiveness of teaching and learning of agricultural science. Availability of resourceful libraries and laboratories in schools provide a good learning environment for students in reading, understanding content and, consequently, performing better. Therefore, the result is supported by findings of Osaikhiuwu, [25], Bizimana and Orodho [26] and Osman et al. [27] who reported that lack of physical amenities and academic facilities such as resourceful libraries and laboratories influence students learning negatively and thereby becomes a significant challenge that can influence the performance of students.

Too little practical was also an identified challenge. Lack of practical content will not expose students to the real-life experiences in learning agriculture as a subject and will not generate student interest in learning agriculture. This is in line with Ojukwu [35] and, Moyo and Maseko [32] studies which suggests that the inadequacy of practical experience influenced the performance of students negatively. This little practical work in agriculture science learning is due to too much theoretical work within agricultural science courses which was determined by the results of the study. This finding supports the one by Lee and Sulaiman [36] who report that students who are involved in less practical agricultural work performed poorly than those who were more involved. Insufficient time to complete the curriculum is also a challenges militating against effectiveness of teaching and learning agricultural science. Some slow learners may need extra help in order to understand the content, which requires extra time and attention. Unavailability of time for private tutoring can impact on students' learning [37].

In summary, the findings of the study clearly showed that, the teaching and learning of agricultural science is ineffective in the colleges of education in Ghana. However, this ineffective teaching and learning of agriculture is cause by a number challenges which were identified in the study.

5. CONCLUSION AND RECOMMENDATION

This study assessed the effectiveness of teaching and learning of agricultural science

including the challenges facing the teaching and learning of agricultural in colleges of education in Ghana. The teaching and learning of agriculture were found to be ineffective in the colleges of education in Ghana. These ineffective teaching and learning in agriculture were caused because there is ineffective communication among tutors and students, tutors do not give room for students to work in pairs or small groups in classrooms, tutors do not give room for students responding to one another in a class discussion, and therefore learning becomes less interactive for students. Several challenges affecting the teaching and learning of agricultural science in the colleges of education were identified. The eight most important ones were identified as poor teaching approach, inadequate tools and equipment, too little practical, Lack of resourceful libraries and laboratories, insufficient time to complete the curriculum, too much theoretical work within agricultural science courses, lack of internet in the schools and lack of proper school farms/gardens.

The study recommended that;

- ✓ Tutors in the colleges of education should include more practical component in their instructional hours, to minimize the theoretical nature of agricultural science.
- ✓ Colleges of Education administrators should provide adequate funding for students to have access to the internet, resourceful libraries and laboratories for effective teaching and learning to take place.
- ✓ The school should provide essential instructional materials including school farms/gardens for effective teaching and learning of agricultural science.
- ✓ College of education tutors should regularly reflect on their practices and adopt varied instructional strategies that promote healthy interaction among students and teachers for effective learning.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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