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USING THE ACTIVITY-BASED APPROACH TO FACILITATE THE TOPIC 'SUSTAINABLE LAND PREPARATION TECHNIQUES' AMONG STUDENT TEACHERS: A CASE STUDY IN BAGABAGA COLLEGE OF EDUCATION

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ABSTRACT

The study assessed using the activity-based approach to facilitate the topic 'sustainable land preparation techniques' among student teachers. Action research was adopted for the purpose of the study. The study used three achievement test research questions as a guide and adopted the case study design. The topic was previously taught through a traditional lecture-based format which revealed that student engagement was poor and learning was limited. Student engagement was measured through a questionnaire and case study. The instrument used to collect data for the study was a questionnaire. One hundred and twenty-two agriculture/Home Economics students' teachers of the 2022/2023 academic year were used. For the encouragement of student understanding, a wide variety of activities were used. These activities included think-pair share, role plays, presentations, self-reflection, and written submissions. The findings reveal that the overall performance of the students after the intervention showed they were able to differentiate between the two concepts. The findings also revealed that an activity-based approach enhanced student teachers' knowledge of the topic of sustainable land preparation techniques and motivated student teachers not to perceive the topic of sustainable land preparation techniques to be difficult. The study concluded that Student teachers' learning was achieved through the completion of a series of activities based on different topics covered in sustainable agriculture practices.

Keywords: Sustainable Agricultural Practices, Activity-based approach, land preparation techniques.

1. INTRODUCTION

For the two years of teaching student teachers on the course sustainable agricultural practices it became evident that some students were not getting the concept of most of the topics. There were several factors militated against deep learning of sustainable agricultural practices. From a learning point of view, the subject matter was perceived as lacking context and being boring, attendance was poor, and there was little engagement with the material. From a teaching perspective, it was difficult to engage students and measure the extent to which the learning outcomes were achieved. It was believed that the absence of a context made the material in the lecture-based method module too difficult for students to fully grasp and put into practice. In addition, the method of learning did not engage students. Following a review of different learning and teaching methodologies, an activity-based approach to learning sustainable agriculture practices was considered to be a more effective learning methodology than the traditional lecture format for the delivery of this course. This study was devised to address these issues. The study focused on using the play-based method to allow students to appreciate the importance of undertaking this course and the techniques necessary to achieve this.

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The term "sustainable agriculture" refers to integrated technical systems that maintain environmental quality in plant and animal production techniques, which is essential to meeting human needs for food and fiber. Sustainable agricultural methods are critical to the planet's long-term health. These methods entail using eco-friendly techniques that support sustainable agricultural output, preserve natural resources, and safeguard the environment. , (Sims, B.& Kienzle, J. 2017).

Assuring the achievement and continuous satisfaction of human needs for both the present and future generations through sustainable agriculture means managing and conserving the base of natural resources and guiding institutional and technological transformation in that direction. With the goal of providing society with food and textiles in the present without compromising the ability of future generations to satisfy their own requirements, sustainable agriculture is a new type of agriculture that has arisen to meet the demands of the expanding population. , (Sofiyuddin , Suyanto , Kadir , & Dewi, 2021)

Sustainable agriculture is about the importance of human and environmental health. The concerns about soil degradation, water availability, food quality and security, nutrition-related diseases, animal welfare, and human-induced climate change are putting the spotlight on agriculture (Wezel, Goette, Lagneaux, Passuello, Reisman, Rodier, & Turpin, 2018)

Siebrecht, (2020) stated that the key methods of sustainable agriculture include the use of cover crops to boost soil fertility, conservation tillage to enhance soil quality, integrated pest management, soil conservation, and crop rotation approaches to minimize the need of chemical inputs.

By enhancing land management, lowering soil erosion, and boosting biodiversity, sustainable agricultural techniques can lessen the effects of climate change. Familiarity with sustainable land preparation procedures is necessary to comprehend the role that agricultural management practices play in maintaining the fertility and productivity of arable soils (FAO 2013).

In order to preserve biodiversity, soil resilience, and the natural environment, their main priority is minimizing the use of pesticides and herbicidal chemicals. In order to maintain the original quality of the soil, it also emphasizes methods for replacing soil plowing and reducing or eliminating tillage. (Sims, & Kienzle, 2017).

Dara (2019) stated that a sustainable agriculture strategy ought to emphasize the significance of protecting natural resources (such as land, water, forests, and the atmosphere) while making efficient use of them in agricultural production. By raising awareness, enforcing resource conservation, developing better technology, and managing rainwater, rivers, tanks, and groundwater safely and effectively, all land users for agriculture should be encouraged to use natural resources sustainably.

Learning through tasks or activities is known as an activity-based method. Practical exercises and experiences are the main means of instruction in an activity-based approach. The learning process is made more effective and engaging by emphasizing active engagement. Students can apply their academic knowledge to real-world scenarios with this method, which develops their capacity for creativity, critical thinking, and problem-solving. Students actively participate in group projects, experiments, labs, and real-world simulations when learning using activity-based methodologies. Students investigate and discover concepts and principles either independently or in small groups, depending on the nature of the task. In order to ensure that students complete the activities successfully, teachers facilitate the learning process by offering resources and

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guidance. If pupils are involved in their education in an active way, they will probably, (Ajayi, 2017; Akhtar, & Saeed, 2017; Anand, 2021)

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Hussain, Anwar, and Majoka (2011) suggested that the best teaching conditions are produced when activity-based learning is combined with peer instruction. Students actively participate in practical experiences and have the opportunity to connect abstract concepts and theories with real-world observations in an activity-based learning environment. This aids in their in-depth comprehension of scientific ideas.

Students' understanding of scientific concepts is aided by the activity-based approach. Students who actively participate in teaching-learning processes and activities are better able to apply scientific knowledge in a variety of real-world contexts. Additionally, the activity-based approach enhances students' academic performance and attitudes toward learning (Shah & Rahatb, 2018).

A study carried out by Haq, Khurram, and Bangash (2017), on the development of Speaking Skills through Activity Based Learning at the Elementary Level, showed that in terms of speaking achievement on the post-test, the experimental group outperformed the control group by a substantial margin. A pretest-posttest similar group design served as the foundation for the research.

Ahmed (2019) evaluated the impact of Activity-Based Based Learning on Students' Achievement and found that it raises students' achievement to get better test scores. This is due to the fact that knowledge and information are communicated and stored in the brain more effectively using this technique. They continued by saying that activity-based learning techniques guarantee the elimination of obstacles to learning, facilitate information retrieval—especially during tests—and promote higher-order thinking abilities.

Golji and Dangpe, (2016) also found that students felt that the activity-based learning approach increased their sense of accountability to society and to themselves. The belief among the students was that a teacher may foster a sense of responsibility by providing flexibility in decision-making, allowing the student to select their preferred mode of learning, and making certain decisions independently.

Pupils can explore their interests and grow in a variety of ways with activity-based learning. More so than with other approaches, activity-based learning involved direct student participation in the learning process. (Ahmed, 2019).

According to Sarpong, Sarpong and Asor (2020) who looked into the impacts of the activity-based teaching approach used to teach social studies on students' retention and academic performance in the Ashanti Region's Sekyere South District found that the approach promoted the development of higher order thinking skills in students as well as their ability to retain social studies concepts, participate actively in class, maintain their interests, and maximize their potential for academic success. The study also discovered that activity-based teaching techniques including cooperative learning, problem-solving learning, and cooperative learning have a favorable, significant impact on students' social studies retention.

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Statement of the Problem

Students often have difficulty in engaging and understanding the following topic sustainable land preparation techniques during teaching and learning. Students were confused with the traditional land preparation techniques to the sustainable land preparation techniques. The use of an activity-based approach can help student's teachers to differentiate between the two concepts. This will go a long way to be able to impart the same knowledge gained when they embark on their teaching career because they will obtain the needed skills and methodology. It is in light of these observations and reviewed literature that this study was initiated to use an activity-based approach to allow students and teachers to improve their knowledge and methodology in sustainable land preparation techniques.

Research Questions

The study answered the following research questions:

1. Will the activity-based approach eliminate the confusion between the topic of traditional land preparation techniques and sustainable land preparation techniques by student teachers?
2. How will the activity-based approach motivate student teachers to grasp the content knowledge on the topic of sustainable land preparation techniques?
3. Will the use of an Activity-based approach improve the content knowledge on the topic of sustainable land preparation techniques?

2. MATERIALS AND METHOD

An action research approach was employed. The target population was all Agriculture/Home Economics students and teachers in the Bagabaga College of Education, Tamale. The accessible population was the 2022/2023 academic year students of Agriculture/Home Economics class in the Bagabaga College of Education, Tamale.

A purposive sampling technique was employed using all the 132 students' teachers of Agriculture/Home Economics class. The students were put into nineteen groups and each group consisted of seven students except for one of which consisted of six members.

The main research instrument used for the study was the achievement test which was constructed. A three-item test was used before the intervention (as a pretest) to determine the level of performance of students involved in the study on the first three topics of the course Sustainable Agricultural Practices in the first week of the study. Short-answer type test was used in the pretest which lasted for 20 minutes.

The test items were:

(1) What is sustainable land preparation techniques?

(2) Explain five (5) sustainable land preparation methods.

(3) Differentiate between cover crop basic sanitation and crop rotation

Pre-Intervention

The pre-test was carried out at the end of each topic. The test questions were sampled from the past questions of 2022 JBA 352 Sustainable Agricultural Practices End of first Semester examination of the Four-year Bachelor of Education programme question one (1).

The pre-intervention test consisted of three easy-type test items. The items were only on sustainable land preparation techniques. The test was administered to all the hundred and thirty-

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two students during the first week of the study. The duration of the test was 20 minutes. These tests were collected and scored.

Intervention implementation

[Considering the performance of the pupils in the pre-test a play-based activity was used each for the three topics covered as an intervention strategy to help improve students' performance in teaching and learning of the concept of greening TVET and sustainable land preparation methods.

Post- Intervention

A post-intervention test was carried out to assess the student's understanding of the three topics after three weeks of meeting. The various activities were used to teach the topics. The students were given tests on the topics. The pre-intervention test items were also used in the post-test. The duration of the test was the same 20 minutes. The tests were scored and analyzed. The difficulty indices of the pretest and posttest items could be said to be the same. This is because the concepts being developed by the test items in the posttest were the same as those of the pretest.

The data collected was analyzed with the use of frequency distribution tables and charts. Responses with the highest percentages were considered to be the general opinion concerning that question. Also, Pearson's correlation coefficient was used to test for a relationship between independent variables (teaching methodologies) and dependent variables (sustainable land preparation techniques knowledge). Pearson's correlation coefficient (non-parametric) assesses the linear association between two variables.

3.RESULTS AND DISCUSSION

The activity-based approach was used to teach students to eliminate the confusion between traditional land preparation techniques and sustainable land preparation techniques.

The table presents the results of the research question for analysis and discussion

Table 3.1 Correlation between frequency of using activity method and Sustainable Agricultural land preparation knowledge gained by student's teacher

Test item	Question 1	Question 2	Question 3
Traditional Method			
Pearson correlation	0.273**	0.221*	0.164*
Sig. (2-tailed)	0.000	0.656	0.034
N	132	132	132
Activity-based learning			
Pearson correlation	0.335**	0.245*	0.225*
Sig. (2-tailed)	0.000	0.000	0.005
N	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed)

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*. Correlation is significant at the 0.05 level (2-tailed)

Table 3.1 demonstrates that at the 0.01 and 0.05 alpha levels, there was a positive connection and significant knowledge displayed by both Traditional teaching techniques and Activity-Based learning methods with the dependent variables (the three test items) that students and teachers felt they had learned.

At the 0.01 levels believed to be learned by students during instructions, both traditional teaching methods and activity-based learning methods showed positive correlation and significant knowledge demonstrated with test item 1 related knowledge ($r=0.273., p<0.01$) and ($r=0.335., p<0.01$), respectively. Activity-based learning techniques showed a stronger correlation with the test items than Traditional teaching methods, despite the fact that both approaches were significant at 0.01; for this reason, Activity-based learning techniques are the preferable choice when instructing students in sustainable land preparation techniques.

Reiterating their positive correlations with knowledge, Traditional teaching techniques and activity-based learning methods showed positive correlations with knowledge in question 2 ($r=0.221., p<0.05$) and question 3 ($r=0.164., p<0.05$) and all 0.05 significant levels, respectively. Activity-based learning approaches showed greater correlations with content knowledge acquisition in every instance. The results are consistent with research conducted by Shah and Rahatb (2014) and Çelik (2018) on the relationship between academic accomplishment and the activity-based approach, which found that the technique aids in students' understanding of scientific topics. Students apply scientific information in a variety of real-life circumstances when they actively participate in teaching-learning processes and activities, and the activity-based approach raises students' academic performance. .

3.2 The use of an activity-based approach to teaching and motivation

Table 4.2 analyzes the result of how the activity method motivated students' teacher content knowledge on the topic of sustainable land preparation techniques

Table 3.2: Responses from the questionnaire on the activity method and motivation in demonstration of content knowledge on the topic of sustainable land preparation techniques

Responses	Number of Respondents	Percentage (%)
Highly motivated	67	50.7
Motivated	54	41
Did not motivate	11	8.3
Total	132	100

Table 3. 2 shows the students' responses from the questionnaire on the activity method and motivation on the demonstration of content knowledge on the topic of sustainable land preparation techniques.

This section deals with the discussion of results based on data collected on the questionnaire. The data were used to answer the second research question that guided the study

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The data indicate that 50.7% of the respondents stated that the activity method of teaching highly motivated them to grasp the concepts, 41% of them said that it motivated them and 12.2% of them indicated that it did not them grasp the content knowledge

This indicates that the majority of students agree with the statement in Table 4. 2. This means that students who receive activity-based treatment seem to recognize that this particular teaching method can motivate them to acquire knowledge on the topic of sustainable land preparation techniques**.** Similar studies by Khan, Muhammad, Ahmed, Saeed and Aman, (2012) confirmed that the use of an activity-based approach instructional strategy enhanced overall student learning outcomes and that student learning outcomes improved over time with changes in teachers` teaching methods. It also implies that activity-based teaching in students helps to motivate students' content knowledge of the concept.

3.3 Activity Method and Improvement of Content Knowledge

The post-intervention results used to answer this research question three have been presented in Table 4.3 for analysis and discussion.

Table 3.3: The use of Activity Method and improvement of Content Knowledge on test scores

Marks	No. of pupils (pre-test scores)	Percentage (%)	No. of pupils (post-test scores)	Percentage (%)
0 – 4	16	12	0	0
5 – 10	76	57.6	11	8.3
11– 15	24	18	64	48.5
16 – 20	16	12	57	43.2
Total	132	100	132	100

Table 3.3 shows the results of pre-intervention test and post-intervention test scores. The data indicated that out of 132 students who took part in both the pre-intervention test and post-intervention test, the total number who passed for the pre-test was 40 while the post-test was the total number was 121. This indicated that the number of students increased about two times the post-intervention test over the pre-intervention test number. This implies that an activity-based approach to teaching and learning improved the content knowledge of student teachers. The finding conforms to the study carried out by Ahmed (2019) who assessed the impact of Activity-based Based Learning on Students' Achievement which revealed that activity-based learning increases students' achievement to gain higher scores in the examination.

This is because information and knowledge are transmitted and stored better in the brain through this method. They added that activity-based learning strategies ensure the removal of blocks that hinder new learning, help to retrieve information easily, especially in the exams, and encourage higher-order thinking skills.

4. FINDINGS AND RECOMMENDATIONS

The study revealed that activity-based approach eliminated the confusion between the topic of traditional land preparation techniques and sustainable land preparation techniques by student teachers. Activity-based learning methods had a stronger relationship with the test items than

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Traditional teaching methods hence Activity-based learning methods are the better option to be used to teach sustainable Agricultural land preparation that would result in more demonstration of acquisition of knowledge

The study also revealed that the activity-based approach motivate student teachers to grasp the content knowledge on the topic of sustainable land preparation techniques. This because the activity method engages students to think critically, analyse and synthesis the content knowledge which gives them first-hand experience. Students' active involvement in teaching-learning processes and activities helps them in the application of scientific knowledge in various real-life situations and the activity-based approach improves students' academic achievements

The use of an Activity-based approach improve the content knowledge on the topic of sustainable land preparation techniques which increased student's scores in the achievement test. The activity-based approach to teaching and learning improved the content knowledge of student teachers, resulting to better storage of the contents knowledge in the brain helping in the quick and easy retrieval of information especially during examinations.

The study concluded that activity-based approach eliminated the confusion between the topic of traditional land preparation techniques and sustainable land preparation techniques by student teachers. Activity-based learning methods had a stronger relationship with the test items than Traditional teaching methods hence Activity-based learning methods are the better option to be used to teach sustainable Agricultural land preparation that would result in more demonstration of acquisition of knowledge

The study also concluded that the activity-based approach motivate student teachers to grasp the content knowledge on the topic of sustainable land preparation techniques. This because the activity method made the lesson practical, interesting and enjoyable. Students' active involvement in teaching-learning processes and activities helps them in the application of scientific knowledge in various real-life situations and the activity-based approach improves students' academic achievements

The use of an Activity-based approach brings about lifelong learning, generating positive attitudes towards examinations. The activity-based approach to teaching and learning improved the content knowledge of student teachers, resulting to better storage of the contents knowledge.

Students and teachers both play roles in this learning process which is active for both. The activity-based approach is important to accord students not only basic concepts but also to build deeper understanding and connect between different types of content knowledge.

Based on the findings of this research,

It is recommended that the activity-based approach to teaching the topic of sustainable land preparation should be used to enhance students` learning outcomes. The hands-on activities should be submerged into the daily lesson sessions.

Additional qualitative research should be conducted, to explore the relationships between role plays and activity method in the teaching of others topics in Agriculture.

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