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Research Paper

Application of Ergonomics Principles on Student's Acquisition of Psycho Productive Skills in Maize Production in Senior Secondary Schools in Gwagwalada Area Councils-Federal Capital Territory, Abuja

IKELUSI, Caroline Onyebuchi
All Christian Fellowship Mission
Nyanya. Abuja

Osinem, Emanual. C.
Department of Agricultural Education
Faculty of Vocational and Technical Education
University of Nigeria, Nsukka.

Abstract
A pretest, post-test, non-equivalent control group, a quasi-experimental research design was employed to determine the effect of the application of ergonomic principles on students' acquisition of psycho-productive skills in maize production in secondary schools. The area of the study was the Gwagwalada area council in F.C.T Abuja. Three research questions and three null hypotheses guided the study. The population for the study was 300 students of agricultural science in Senior Secondary School One (SS1) from which 62 students' were sampled. The instrument used for data collection was psycho-productive skills performance test items (PSPT). The items were drawn based on the identified productive skills in maize production which covered the two operational skills in maize production (post-planting and post-harvesting operations). The instruments were given to experts who validated items in terms of face validation. The PSPT was trial-tested to determine the reliability coefficient. The instrument was administered on a sample of 20 Students' in Government Secondary School Mararaba, in Nasarawa State. Cronbach alpha statistical tool was used to compute the reliability coefficient was 0.79. Data collected for the study were analyzed using the mean to answer all the research questions while Analysis of Covariance (ANCOVA) was used to test the three hypotheses at a 0.05 level of significance.

Keywords, Ergonomics Principles; Psycho Productive Skills; Maize Production

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I. Introduction

Ergonomics is the study of people concerning their working conditions, especially in the design of tools, equipment and furniture to help an individual work efficiently. Kogi (2002) noted that ergonomics removes barriers to quality, productivity and safe human performance by fitting products, tasks and environments to people. The author added that ergonomics improves the academic performance of the learner. Mokdad (2005) viewed ergonomics as the systematic study of people at work to improve the work situation, the working condition and the tasks performed. Mokdad added that ergonomics removes barriers to quality, productivity and safe human performance by fitting products, tasks and environments to people. Thatcher, James and Todd (2005) defined ergonomics as a science that aims at studying human abilities and limitations and then applying the knowledge to improve people's interaction with products, systems and environments. In the context of this study, ergonomics involve the systematic study of students' interaction with equipment and tools used in applying psycho productive skills in maize production.

Ergonomics is beneficial to people in several ways. Kadiri (2008) outlined the following as benefits of ergonomics that could enhance workers/learners performance and adjustment to their work environment. Ergonomics improves the safety and health of the workers in the workplace, improves productivity and quality of work, reduces absenteeism of the workers/learners, reduces occupational injuries and illness, reduces medical cost and workers' compensation associated with cumulative trauma disorder. Mevey (2001) stated that knowledge ergonomics helps the teacher to manage the physical learning environment for effective teaching and learning processes. Mevey added that ergonomics has certain principles guiding its application.

Ergonomics principles are techniques of doing work effectively. Kadiri (2008) defined Ergonomics Principles as methods of preventing work hazards, stress and fatigue in the workplace. Bridger (2003) stated that Ergonomics principles are strategies or techniques which enable an individual to perform tasks efficiently in the workplace. In the context of this study, Ergonomics principles are new methods or techniques that could be applied in teaching/learning psycho productive skills in maize production to enable students to perform tasks effectively on the school farm. It also involves strategies to motivate and sustain students' interest in practical agriculture.

The principles of ergonomics used for this study are four, namely:-principle of a comfortable environment, the principle of organizing and keeping materials in easy reach, principles of safety in the workplace and principles of good working postures (Macleod, 2006).

A comfortable work environment is a place where work is carried out with less distress. The principle of a comfortable environment according to Macleod (2008) is an environment where work activities can be performed effectively by an individual. The author explained that the physical environment where workers carry out their work should be made friendly or conducive by making them neat, descent, devoid of dangerous materials, stimulating and attractive for maximum productivity and efficiency of work. Tepper (2008) stated that a comfortable environment when performing tasks tends to motivate the workers/learners to work efficiently without stress and pain. Olaitan and Mama (2001) stated that a friendly or favourable environment for agriculture makes learning easy and sustain the interest of the students in performing practical activities on the farm. In this study, a comfortable environment for maize production involves suitable land for practical agriculture, adequate and appropriate tools and equipment in the school farm by the students for practising operational skills in maize production.

Most secondary schools in the Federal Capital Territory have suitable learning environments and a school farm laboratory for learning agricultural practical activities. Inadequate provision of tools, equipment and improper methods of teaching and learning of agricultural science affects the students' negatively. The application of the ergonomic principle of a comfortable environment will help to sustain student interest in the study of agriculture and enable them to acquire psycho, productive skills in crop production (Sagus,2008).

The principle of organizing and keeping materials in easy reach according to Kanep and Legg (2007) involves adequate provision, organizing and keeping the working materials such as equipment and tools within the comfortable reach of the workers or learner. The author added that an easy way to make the task user friendly is to keep frequently used items very close to the worker/learner. Olaitan and Mama (2001) explained that organizing and keeping materials for easy reach in the school farm involves arranging all requisite resources including human, farm inputs and facilities in a systematic order such that when they are being used or applied in the school farm, the operation will be without interruption. In the context of this study, this principle implies that all the tools and equipment used to perform operational skills in growing maize are organized and kept safe in farm laboratories or farm stores for easy reach. This will minimize repetitive movement on the farm while performing practical activities in agriculture. In most secondary schools in the study area, obsolete tools and equipment used to deliver instruction are not organized according to the order of use. Most of these materials are scattered in the school premises and are not easily reached to students for performing tasks easily on the farm.

Principle of Safety means safety precautions or measures in the workplace to protect workers/learners', equipment and tools from accidents, injuries and hazards. The principle of safety in a workplace according to Kadiri (2008) is the condition of being protected against physical, social, emotional and psychological problems, injuries or consequences of failure, damage, accidents or harm. Olaitan, Nwachukwu, Igbo, Onyemachi and Ekong (1999) explained that safety in any industry involves safety measures or precautions and maintenance services in handling equipment, tools and chemicals in performing farm operations. In this study, this principle implies the provision of appropriate tools and equipment for students for the performance of tasks in the growing of maize on the school farm. This also involves the provision of protective farm wears such as hand gloves, overalls, work boots and hats (helmets) to students to prevent them from sustaining injuries or hazards during practical activity on the farm.

Lack of safety precautions in the school farm in most secondary schools in the study area exposes the students to hazard and ill health. The provision of inappropriate tools and equipment, poor utilization of materials and wrong handling of tools and equipment in carrying out practical activities such as clearing of the land, stumping, ridging among others, exposes the students to hazard in the farm such as stress, fatigue, injuries

and accidents. These problems result in students' loss of interest in farm activities, absenteeism and poor academic performance (Onyebu 2007). Applications of ergonomics principles of safety in practising operational skills in maize production will help to protect the students from hazards and drudgery associated with farm operations.

Another principle of ergonomics is the Principle of good neutral postures. Macleod (2006) stated that neutral postures are good working postures required by the workers/learners to perform tasks in the workplace. Apadiji (2002) stated that good working posture is the comfortable position of an individual while performing tasks in the workplace. Mokdad (2005) noted that good working posture is essential when performing tasks with the machine, equipment and tools in any organization or industry. The author added that performing jobs with good working posture reduces fatigue, stress, accident and maximize productivity. In this study good working posture in crop production implies that comfortable working postures of students in clearing the land, tilling the soil, weeding, and application of fertilizers among others.

The wrong postures of the students in performing farm activities expose them to injuries and pains. Kadiri (2008) posited in the handling and utilization of tools and equipment in carrying out farm operations result in drudgery, fatigue, poor performance and inefficiency. The Ergonomics principles are used or combined in a single task to ensure maximum productivity and efficiency of work. If these principles are applied in maize production, it will help the students of agriculture to acquire psycho productive skills which will enable them to be productive in the world of work.

Psycho productive skills are acquired abilities or manipulative skills for performing jobs on the farm. Psycho productive skills according to Olaitan and Agusiobo (1981) are manipulative or technical skills needed for performance in any given occupation which could be acquired through observation, training and learning. In the opinion of Osinem (2008), psycho productive skills are manipulative skills or motor skills which are required to perform certain activities efficiently. Similarly, Olaitan and Ali (1997) stated that psycho productive skills involve acquired abilities for performing tasks adequately with the muscles in response to sensory stimuli. The authors added that the ability to perform well by an individual arises from a repetitive process in which skill holders engage in their jobs, and this becomes part of the individual to the extent that the performance becomes automatic. That is, the individual is never reminded before performing the skills step-by-step until the final product is obtained. The authors further explained that psycho productive skills involve the use of the head, heart and hand in the expression of dexterity to accomplish tasks effectively. It involves thinking habits, process habits, manipulative habits and performance which is one of the most vital aspects of learning for living.

In the context of this study, psycho productive skills involve manual dexterity required by students of agriculture for manipulation of tools and equipment and the step-by-step procedure of using them to accomplish the operational skills in maize production through the application of ergonomic principles.

Crop production is the process involved in growing and managing crops on the farm. Uguru (2005) defined Crop production as the art and science of breeding the crops, growing and management of desired crops for maximum productivity. The author further explained that crop production also involves the harvesting, processing, storage and marketing of agro products. In the opinion of Harper (1999) crop production involves the sowing or planting of crops and the progression from young plants through the subsequent phases of growth and development to the harvesting of the economic yield.

Teaching is the process of imparting knowledge, skills and attitude to the learner. Offorma (2002) defined teaching as a systematic activity deliberately engaged in by somebody to facilitate the learning of the intended worthwhile knowledge, skills and values by another person and getting the necessary feedback. In the opinion of Kirkpatrick (2004), teaching is the art of providing knowledge, skill and attitudes to a person or giving a person instruction and training. Similarly, Olaitan (2003) stated that teaching and learning of agricultural science in secondary school involves the three-domain of learning namely: cognitive, psychomotor and affective. The author added that it involves the use of tools and equipment, effective demonstrations of skills acquisition by the instructor and effective teaching of the curriculum. In the context of this study, teaching is the process of assisting students of agriculture in senior secondary school to learn psycho productive skills in maize production through the application of ergonomic principles. These students have various levels of abilities; low and high. Teaching the students to acquire psycho productive skills in maize production with the use of ergonomic principles ensures a conducive learning environment that motivates students' interest and active participation in learning practical skills. It also encouraged low ability students to perform the operational skills in agriculture effectively.

Ability is the natural tendency or competence to do something successfully. In the opinion of Hills (2002), the ability level of students differs in terms of academic performance. The Author classified some students as high academic achievers. That is the students whose academic performance in tests and tasks are always high while others are classified as low academic achievers due to their low performance in tests and tasks. The differences in students' academic performances according to Mac-Iver (1988) are more easily discerned when all the students in a class do the same task at the same time than when each student uses

different materials to work individually. The students of agriculture in senior secondary schools performed the activities on the school farm at the same time while the teachers observed their performances and rate their scores.

A secondary school is a school for students who have completed their primary school education before tertiary education. National Policy on Education (FRN,2004) defined secondary school as the education children received after primary education and before the tertiary stage. . It has two phases; the first phase is three years of Junior Secondary School while the second phase is three years of Senior Secondary School. Olaitan (2003) viewed secondary school as a post-primary education that students attend after primary education and before tertiary institutions. In the context of this study, secondary school is a post-primary education of six (6) years programme which students of agriculture attend before tertiary institution. This study covered senior secondary schools in Federal Capital Territory, Abuja.

The major aims of teaching agricultural science in senior secondary schools are to stimulate students' interest in agriculture; enable students to acquire basic knowledge and practical skills in agriculture; prepare students for further studies in agriculture; prepare and expose students to occupations and opportunities in the field of agriculture(FRN,2004). However, these objectives have not been properly achieved (Onyebu, 2007). The interaction of the researcher with the student revealed that most students of agriculture in senior secondary schools in the study area have low interest and negative attitudes towards agricultural practical activities. These students viewed agricultural science as a strenuous and dirty subject, full of drudgery and fatigue. This results in students' absenteeism, poor academic performance and lack of skills acquisition. Furthermore, the researcher's interaction with the students revealed that most students of agriculture who graduated from Senior Secondary School in the study area were unable to demonstrate psycho productive skills in any production areas of agriculture when required to do so. Commenting on the negative interest of students and lack of skills acquisition, Olaitan (1996) stated that though the secondary school curriculum emphasized the acquisition of basic skills and knowledge in all occupation areas of agriculture, most graduates of senior secondary schools are not capable of demonstrating productive skills in agriculture when required to do so.

The students' inability to acquire psycho productive skills could be traced to the conventional methods such as the lecture method which teachers of agriculture used to deliver instructions in the classroom and their inability to expose the students to practical agriculture. These conventional methods are teacher-centred, full of drudgery and strenuous to the students. This affects the interest of students in agriculture negatively and also exposes the students to hazards, stress and fatigue. Therefore, it is necessary to use alternative instructional techniques that will motive and sustain students' interest in practical agriculture and also enhance their skill acquisition. This study, therefore, was carried out to determine the effect of ergonomic principles on students' acquisition of psycho productive skills in maize production in senior secondary schools in the federal capital territory Abuja.

Statement of Problem

Agricultural science is the subject taught in senior secondary school to stimulate and sustain students interest in agriculture and equip them with psycho productive skills that will enable them to be self-reliant in the world of work. However, these objectives have not been properly achieved. The interaction of the researcher with the students revealed that most students of Senior Secondary Schools in Abuja have low interest and negative attitudes towards agricultural activities. These students viewed agricultural practical activities as strenuous, dirty work, labour intensive, full of drudgery and hazards. This results in students' absenteeism, poor academic performance and lack of skills acquisition. More so, the researcher's interaction with the students revealed that most students of agriculture who graduated from Senior Secondary School in Abuja were unable to demonstrate psycho productive skills in any production areas of agriculture when required to do so .commenting on the students' inability to demonstrate productive skills, Olaitan(1996) stated that though Secondary Schools' agricultural science curriculum emphasized the acquisition of basic knowledge, attitude, and skills in all occupational areas of agriculture, most graduates of Senior Secondary Schools are not capable of demonstrating productive skills in agriculture when required to do so. The students'negetive attitude and low interest in agriculture, lack of skills acquisition and low academic performance of the students could be traced to conventional methods which teachers of agriculture used to deliver instruction. These conventional methods such as the lecture method are teacher-centred and subject matter-oriented, full of drudgery and strenuous to students. Conventional methods do not emphasize the psychomotor domain aspect of education which encourages learning by doing. It also exposes the students to hazards, stress and fatigue. There is a need to adopt a new instructional technique that will stimulate and sustain the interest of students in agricultural science, improve their academic performance and enhance their skill acquisition in secondary schools. It is assumed by this study that the application of ergonomics principles in teaching students psycho productive skills in maize production could provide the skill training environment for students to bridge the existing gap of low interest and lack of skills acquisition by the students of agriculture in senior secondary schools. Therefore, this study

was carried out to determine the effect of the application of ergonomics on students' acquisition of psycho productive skills in maize production in senior secondary schools.

Research Questions

1. What were the mean psycho productive skills performance scores of students exposed to ergonomic principles in post-planting operations in maize production and those taught with a conventional method?

2. What were the mean psycho productive skills performance scores of students exposed to ergonomics principles in post-harvesting operation in maize production and those taught with a conventional method?
3. What was the mean psycho productive skills performance scores of high ability and low ability level students exposed to ergonomics principles in maize production and those taught with a conventional method?

hypotheses

1. There was no significant difference in the mean psycho productive skills performance scores of students exposed to ergonomics principles in post- planting operations in maize production and those taught with a conventional method.
2. There was no significant difference in the mean psycho productive skills performance score of students exposed to ergonomics principles in post-harvesting operations in maize production and those taught with a conventional method.
3. There was no significant difference in the mean psycho productive skills performance score of high ability and low ability level students exposed to ergonomics principles in maize production and those taught with a conventional method.

II. Methodology

A pre-test, post-test, non-equivalent control group, a quasi-experimental research design was employed to determine the effect of the application of ergonomic principles on students' acquisition of psycho-productive skills in maize production in secondary schools. The area of the study was the Gwagwalada area council in F.C.T Abuja. three research questions and three null hypotheses guided the study. The population for the study was 300 students of agricultural science in senior secondary school one (SS1) in Gwagwalada area council Abuja from which 62 students' were sampled and used for the study. The instrument used for data collection was psycho-productive skills performance test items (PSPT). Another instrument used was an ergonomic lesson plan and a conventional lesson plan. The PSPT items were drawn based on the identified productive skills in maize production which covered the four operational skills in maize production (post-planting and post-harvesting operations). The instruments were given to experts who validated items in terms of face validation.

The PSPT was trial-tested to determine the reliability coefficient. The instrument was administered on a sample of 20 Students' in Government Secondary School Mararaba, in Nasarawa State. Cronbach alpha statistical tool was used to compute the reliability coefficient of the instrument (PSPT) which yielded the following values; 0.76 for post-planting operation and 0.80 for post-harvesting operation. The overall Cronbach Alpha coefficient value for PSPT is 0.79. Data collected for the study were analyzed using the mean to answer all the research questions while Analysis of Covariance (ANCOVA) was used to test the three hypotheses at a 0.05 level of significance.

III. Result

Research Question 1

What were the mean psycho productive skills performance scores of students exposed to ergonomic principles in post-planting operations in maize production and those taught with a conventional method?

Table 1

Mean of pre-test and post-test scores of Experimental and Control Groups in psycho-productive skills performance test in post-planting operations in maize production.

Groups	N	Pretest $\bar{X}$	Posttest $\bar{X}$	Mean Gain $\bar{X}$
Experimental	30	2.22	3.75	1.53
Control	32	2.09	2.51	0.42

The data presented in Table 1 show that the Experimental group had a mean score of 2.22 in the pretest and a mean score of 3.75 in the post-test making a pre-test, post-test making a pretest, post-test mean gain in the experimental group to be 1.53. The control group had a mean score of 2.09 in the pre-test and a post-test mean of 2.51 with the pre-test, post-test mean gain of 0.42. This result shows that the students in the experimental group performed better in the psycho-productive performance test than the students in the control group. This result, therefore, implies that the application of ergonomic principles in psycho-productive skills in post-planting operation is more effective than conventional (lecture) method of teaching.

HO1: There was no signific
ance difference in the mean performance score of students exposed to ergonomic principles in psycho-productive skills in post-planting operations and those taught with a traditional method.

Table 2

Summary of Analysis of Covariance (ANCOVA) for the Test of Significance between the Mean Scores of Experimental and Control Group in psycho-productive skills in post-planting operations in maize production.

Source	Sum of Squares	df	Mean square	F	Sig.
Corrected Model	33.963[a]	2	16.983	276.258	.000
Intercept	14.726	1	14.726	239.567	.000
Control	.023	1	.023	.373	.544
Groups	26.391	1	26.391	429.327*	.000
Error	3.565	59	.061		
Total	584.730	62			
Corrected Total	37.529	61			

Significant at sig. of F < .05

The data presented in Table 2 show F- calculated values for mean scores of Experimental and Control Groups in the psycho-productive skills in post-planting operations in maize production. F- Calculated value for Group is 429.327 with a significance of F at .000 which is less than .05. Hence the null hypothesis is therefore rejected.05 level of significance. This means that there is a significant difference in the mean performance scores of students exposed to ergonomic principles in psycho-productive skills in post- planting operations in maize production and those taught with the traditional method. This means that students taught with ergonomic principles in post-planting operations performed better than those taught with conventional (lecture) methods.

Research Question 2

What were the mean psycho productive skills performance scores of students exposed to ergonomics principles in post-harvesting operation in maize production and those taught with the conventional method?

Table 3

Mean of pre-test and post-test scores of Experimental and Control Groups in psycho-productive skills performance test in post-harvesting operations in maize production.

Groups	N	Pretest $\bar{X}$	Posttest $\bar{X}$	Mean Gain $\bar{\quad}$
Experimental	30	2.10	3.58	1.48
Control	32	1.95	2.42	0.47

The data presented in table 3 show that the Experimental Group had a mean score of 2.10 in the pre-test and a mean score of 3.58 in the post-test making a pre-test, post-test mean gain of the experimental group be 1.48. The control group had a mean score of 1.95 in the pre-test and a post-test mean score of 2.42 with a pre-test, post-test mean gain of 0.47. With this result, the students in the experimental group performed better than students in the control group in the psycho-productive skills performance test. This implies that the application of ergonomic principles in psycho-productive skills in post-harvesting operations is more effective than the conventional (lecture) method of teaching.

HO2: There was no significant difference in the mean performance score of students exposed to ergonomic principles in psycho-productive skills in post-harvesting operations in maize production and those taught with a conventional method.

Table 4

Summary of Analysis of Covariance (ANCOVA) for Test of Significance between the Mean Scores of Experimental and Control Groups in psycho-productive skills in post-harvesting operations in maize production.

Source	Sum of Squares	df	Mean square	F	Sig.
Corrected Model	31.476[a]	2	15.738	204.809	.000
Intercept	11.217	1	11.217	145.970	.000
Control	.088	1	.088	1.145	.289
Groups	20.648	1	20.648	268.712*	.000
Error	4.457	59	.077		
Total	531.690	62			
Corrected Total	35.932	61			

Significant at sig. of F < .05

The data presented in table 4 above show F- Calculated values for mean scores of Experimental and control groups in psycho-productive skills in post-harvesting operations in maize production. The F-Calculated value for Groups is 268.712 with a significance of F at .000 which is less than .05. The null hypothesis is therefore rejected.05 level of significance as there is a significant difference in the mean performance score of students exposed to ergonomic principles in psycho-productive skills in post-harvesting operations in maize production and those taught with a conventional method. This means that students taught with ergonomic principles in post-harvesting operations performed better than those taught with conventional methods.

Research Question 3

What were the mean psycho productive skills performance scores of high ability and low ability level students exposed to ergonomics principles in maize production and those taught with a conventional method?

Table 5

Mean of pretest and post-test scores of High Ability level students and Low Ability level students exposed to ergonomic principles in psycho-productive skills in maize production.

Ability Level	N	Pretest $\bar{X}$	Post test $\bar{X}$	Mean Gain $\bar{X}$
High Ability	14	54.07	61.21	7.14
Low Ability	16	39.06	45.31	6.25

The data presented in Table 5 show that high ability level students had a mean score of 54.07 in the pretest and a mean score of 61.21 in the post-test, making a pre-test, post-test mean gain of 7.14 while the low ability group had a mean score of 39.06 in the pre-test and a mean score of 45.31 in the post-test, making a pre-test, post-test mean gain of 6.25. This result shows that high ability level students exposed to ergonomic principles in productive skills in maize production performed better than the low ability level students, exposed to the same ergonomic principles in a psycho-productive skill performance test in maize production.

HO3: There was no significance in the mean psycho-productive skills test performance scores of high ability and low ability level students exposed to ergonomic principles in productive skills in maize production.

Table 6

Summary of Analysis of Covariance (ANCOVA) for Test of significance between the mean performance score of High Ability level students and low Ability level students exposed to ergonomic principles in psycho-productive skills in maize production.

Source	Sum of Squares	df	Mean square	F	Sig.
Corrected Model	1747.539[a]	2	873.770	59.227	.000
Intercept	200.200	1	200.200	13.570	.001
Pre test	89.467	1	89.467	6.064	.020
Ability Level	100.867	1	100.867	6.837*	0.14
Error	398.328	27	14.753		
Total	84100.000	30			
Corrected Total	2145.867	29			

Significant at sig. of F<.05

Table 6 shows that the F-calculated value for ability level is 6.837 with a significance of F at 0.14 which is greater than .05. Hence, the null hypothesis is therefore accepted at.05 levels of significance. With this result, there is no significant difference between the mean performance score of high ability level students and

low ability level students exposed to ergonomic principles in psycho-productive skills in maize production. This means that high ability level students taught psycho-productive skills in maize production performed better than the low ability level students.

IV. Discussion of findings

1. Effect of the application of ergonomic principle on students' psycho-productive skills in post-planting operations:

The findings revealed that students exposed to the application of ergonomic principles in psycho-productive skills in post-planting operation had a higher mean score than those taught with a conventional method of instruction. Analysis of Covariance was employed to test hypothesis three in table 8 at the calculated F-Value (429:327), the significance of F (.000) and confidence level of .05. There was a significant difference between the students' psycho-productive skills performance in post-planting operations through the application of ergonomic principles and conventional methods of instruction. There was a statically significant difference between the effect of ergonomic principle as instructional technique and conventional (lecture) method of instruction on students' psycho-productive skills performance in the post-planting operation of maize. This finding implies that the application of ergonomic principles in teaching students' productive skills is more effective than the traditional instructional method. This finding is in agreement with that of Aderonke (2010) in a study on "Effects of ergonomic principles on ICT facilities on library staff which revealed that application of ergonomic principles in an organization such as school improves students' performances, efficiency, and productivity and promote their health. Improving students' psycho-productive skills in agricultural practical activities involves proper organization and utilization of instructional materials such as tools and equipment in teaching/learning processes Sawyer (2004) noted that proper organization and utilization of work materials in any organization such as school enhance students' academic performance, minimize fatigue, absenteeism and motivate their interest in learning.

2. Effect of the application of ergonomic principles on students' psycho-productive skills performance in post-harvesting operations:

The finding revealed that the effect of the application of ergonomic principles in students' psycho-productive skills performances in post-harvesting operation is higher than the effect of a conventional method of instruction. Analysis of Covariance (ANCOVA) was used to test hypothesis 5 in table 10 at the calculated F-Value (268:712) significance of F (.000) and confidence level of .05. There was a statistically significant difference between the effect of the application of ergonomic principles (instructional technique) and conventional method of instruction on students' psycho-productive skills performance in post-harvesting operations of maize. This finding implies that the application of ergonomic principles in exposing the students' to psycho-productive skills in post-harvesting operation is more effective than the conventional method of instruction in improving students' manipulative skills, knowledge and attitude. This involves active participation in the learning process using appropriate materials and methods through frequent demonstration of operational activities with the students' on the farm. In learning practical skills, providing a comfortable learning environment through adequate and appropriate working tools and equipment under favourable conditions promotes efficiency, productivity, quality of work and skill acquisition (Khai and Kawa Kami, 2002). Olaitan and Marna (2001) noted that a comfortable learning environment makes the learning of practical activities in agriculture easy to conserve energy, save time, improve students' performance and skill acquisition.

3. Ergonomic Principles and Academic Ability on Students' Psycho-productive Skills Performance in Maize Production:

The findings revealed that students with high ability levels had a higher mean score than students' with low ability levels in psycho-productive skills performance tests in maize production. Analysis of Covariance (ANCOVA) was also employed to test hypothesis 5 in table 12 at the calculated F-Value (6: 837), the significance of F.014 and confidence level of .05. It was found out that there was no significant mean difference in the performance scores of high ability level students' and low ability level students'. The differences in students' academic performances are easily discerned when all the students in a class do the same task at the same time than when each student uses different materials to work individually (Mac-Iver 1988). Hills (2002) noted that the students whose academic performance in tests and tasks are always high are classified as high academic achievers while others are classified as low academic achievers due to their low performance in tests and task.

V. Conclusion

The need to find the best teaching strategy which could help the students of agriculture in learning agricultural practical activities stimulate their interest and enhance their psycho-productive skill acquisition is paramount as productive skill acquisition is very essential in every occupational area of agriculture.

Based on the findings of the study, the following conclusions were drawn: Ergonomic principles as an instructional technique is more effective in enhancing students' performance and skill acquisition in post-planting and post-harvesting operations than the traditional method of instruction. Application of ergonomic principle in exposing students to psycho-productive skills in maize production is more effective in improving students' academic ability level in agricultural practical activities. It is therefore hoped, that if ergonomic principles as an instructional technique are incorporated into teaching and learning of agriculture, it will improve on learning, reduce absenteeism, enhance basic knowledge, attitude and psycho-productive skills acquisition in agricultural practical activities for self-reliance. Consequently, more people will be trained and equipped to take up occupations in Agriculture and become employers of labour instead of hoping solely on paid employment thereby maximizing food production in Nigeria and more raw materials for the industries for economic development.

VI. Recommendations

1. The curriculum planners in collaboration with government officials of the Secondary Education Board (SEB) should integrate ergonomic principles into senior secondary schools agricultural curriculum for effective teaching and learning of practical agricultural science.
2. The Government in collaboration with the Ministry of Education should provide a comfortable learning environment, tools and equipment and other instructional materials needed to teach agricultural practical activities in senior secondary schools.
3. Workshops, seminars and conferences should be organized by the Ministry of Education and Administrators of Secondary Education Board (SEB) to enlighten Teachers of Agricultural science and improve their knowledge, attitude and skills on the use of ergonomic principles as an instructional technique for improving students' psycho-productive skills and motivate their interest in practical agriculture.

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