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Influence Of Supervised Agricultural Experience Programme on Students' Perception of Profitability of Practical Agriculture: A Case of Migori County, Kenya

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ABSTRACT

Agriculture teaching in Kenyan secondary schools, as anchored in the 8-4-4 curriculum, is done to achieve various objectives one of which is to enable the learner to appreciate that farming is a profitable activity. This study, carried out among form three agriculture students in Migori County embarked on finding out if there was a difference in perception about the profitability of practical agricultural activities between learners taking part in a supervised agricultural experience programme (SAEP) and those taking part in conventional agriculture learning approach. A learning outcome test was used to collect data from 384 respondents before and after the programme was implemented. Analysis of data was done using SPSS Version 22. Descriptive statistics (frequencies and averages) were used to present data. Inferential statistics i.e., independent sample t-test, Tukey's post hoc and one-way ANOVA, were used test the null hypothesis at α=.05 significance level. The study discovered that exposure to SAEP did not significantly change the students' perception on profitability of practical agricultural activities. The study recommended that teachers of agriculture should adopt other instructional strategies that learners to appreciate agriculture as a profitable venture.

Introduction

Agriculture is one of the key drivers of world economies, and for this reason, a key objective as to why it is taught in secondary schools is to enable learners to appreciate that it is profitable. In order to make it more lucrative to the young generation, it has to be attracting profits, competitive and with a lot of dynamism (Alliance for Green Revolution [AGRA], 2015). Engaging the young people successfully to increase agricultural productivity may also mean actively involving them in decision-making processes (Njora & Yılmaz, 2022). One of the objectives of teaching Agriculture in schools in Kenya is to show that Agriculture is an economical occupation (KIE, 2002; Njura *et al.*, 2020).

Engaging students in profit-making agricultural ventures at secondary school level will help them

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appreciate the fact that Agriculture is not a dirty job but through it, they can change their perceptions about it and appreciate that they can earn a living and even SAEP can be used as a model to achieve improved learning outcomes in this respect.

The problem

Agriculture plays a significant role in economic and social development of any country, Kenya included, therefore the need for more students to take up Agriculture. The students' enrolment in KCSE Agriculture and uptake in post-secondary institutions is on a downward trend. It is apparent that very few out-of-school students will be able to take up further studies in Agriculture and related careers. Young people having a growing perception that agricultural ventures are not profitable hence shy away from them. The conventional approaches usually used in agriculture teaching have not been able to change this trend this research was conducted to find out if the use of SAEP could change learners' perception about profitability of agriculture.

Purpose of the Study

The purpose of the study was to determine if perceptions about profitability in practical agricultural activities were different between students taking part in SAEP and those taught agriculture through traditional methods.

Objective and Hypothesis of the Study

The objective of the study was to find out the difference in perception about profitability of practical Agricultural activities between secondary school Agriculture students taught through SAE and that learning agriculture conventionally.

The hypothesis of the study was that there was no statistically significant difference in perception about profitability of practical Agricultural activities between secondary school Agriculture students taught through SAE and that learning agriculture conventionally.

Literature

Commercialisation of Secondary School Agriculture as an Economic Venture

Commercialization of Agriculture means doing the farming activities with the sole objective of generating income. Most of the people in the least developed parts of the world are found in rural settings and are greatly dependent on subsistence farming for their livelihoods. As Muricho (2015) puts it, changing of the agricultural sector via commercialization is the most viable means to address the pervasive high levels of rural poverty and food shortages. At school level, commercialization of Agriculture goes far beyond just producing for the school kitchen but scaling-up the production with the sole purpose of selling to earn revenue. Most of the existing school farms, do not involve the students in the commercial components of farm practices. Students engaging in commercial ventures will to a great extent appreciate the fact that Agriculture can be commercialized to gain income. This income can be used to solve immediate students' problems both at school and at home.

According to Wootoyitidde (2010), school Agriculture programme is structured around three major concepts namely: production, protection and economics. These should be taught practically to make a recognizable impact in the society. The economic component of the programmes and projects should be emphasized. Students need to appreciate the fact that production process starts at the farm and ends at selling of the produce.

Waiganjo and Waweru (2018) posit that there is a positive relationship between secondary school agriculture instructional approaches and agricultural productivity. This can only be done when practical education is provided which in turn can raise the contribution of Agriculture to the economy. As can be noted from many African countries, one of the objectives of teaching Agriculture in schools is to create self-reliance, so that graduates from these schools are job creators and not just jobseekers (Chengula *et al.,* 2022; Lawal & Panti, 2021).

One of the main objectives of teaching Agriculture in Kenya is to impart necessary problem-solving skills to the students so that they can transfer them to achieve self-reliance (Omagwa, 2022). It is however reported that the real approach to the teaching of Agriculture is discouraging as the subject is taught theoretically in the classroom and has failed to make an impression on society. This impression could be far much achieved if Agriculture teaching was given the practical outlook that it deserves.

Commercialization of Agriculture Giller *et al.,* (2021) alludes to, does not mean doing it on large tracts of land, but even on small tracks of land including kitchen gardens with the aim of earning any income other than the regular one. This can help boost farmer's living standards as most Kenyan farmers are dependent on Agriculture. It is also worth noting that Agriculture sector is still the biggest employer in this country, whether on farms or in agro-based industries, therefore its contribution in Kenya cannot be underestimated even at school level.

Most school dropouts in Kenya end up in rural areas hence the need to fully equip them with the necessary skills in commercial Agriculture for survival in the world of harsh economic conditions (Morara & Chemwei, 2013). Practical Agriculture teaching helps the students to solve some common economic problems which cannot be solved theoretically. The use of instructional materials enables students to learn while doing (Wootoyitidde, 2010).

There is a positive and significant relationship between agricultural involvement by the students and agricultural income. This means that the probability of young people getting involved in Agriculture increases as the amount of income derived from agricultural enterprises increases (Ahaibwe *et al.,* 2013). This finding affirms the proposition that if Agriculture is made more remunerative and rewarding in terms of incomes and profitability, the youth would indeed be attracted to the sector. In Kenya however, the students, especially those in secondary schools are not actively involved in this aspect. The school projects are part of the final examinations, and effectively, the proceeds from their farming activities are at the disposal of Agriculture teachers and to some extent the school administration.

It is not very well documented how well the Kenyan students participate in practical commercial Agriculture at their homes. This is so because majority of them do not own farms hence the activities done on-farm are at the core control of the parents who own these farmlands. Therefore, even at their homes, students do not see the direct benefits of participating in Agriculture.

Materials and Methods

Research Design

The study adopted the quasi-experimental design (pre-test post-test control group design). In this design, subjects are non-randomly assigned to treatment and control groups. The experimental group is given a pre-test, subjected to a treatment, and then is given a post-test. The non-equivalent control group receives a pre-test, receives no treatment, and then is given a post-test. The non-equivalent control or comparison group would have characteristics that are similar to the treatment group, but the participants would not be randomly assigned to this group because it is impossible to do so (Price *et al.,* 2017).

Independent measures involve using two separate groups of participants; one in each set of conditions. In this design, subjects are assigned to experimental and control groups. Treatment is introduced to the experimental group while the control group receives no treatment. The dependent variable is then measured before and after the experiment. Treatment impact is assessed by subtracting the value of the dependent variable of the control group from the treatment group (Kothari, 2013). The changes in scores would then be evaluated and compared across conditions to determine

whether one group demonstrated a bigger score than another in the learning outcomes.

Target Population

According to Kumar (2018) population is geographic generalization where the object or subject has quality and certain characteristic set by researcher to learning then make the conclusion. The target population of this study was composed of 3,600 Form Three secondary school Agriculture students in Migori County, from which a sample of 384 Agriculture students was drawn.

Sample Size and the Sampling Techniques

There were about 3,600 Form Three Agriculture students in Migori County. A formula by Cochran (1977) for determining sample size was used to get 384 Agriculture students. The equation for calculating sample size is shown below:

Unlimited population: $\mathrm{N} = \frac{z^2 \mathrm{x}\ \hat{p}(1-\hat{p})}{\varepsilon^2}$

Where;

z = the z score

ε = the margin of error

N = population size

$\hat{p}$ = the population proportion

In this study, the researcher uses 95% confidence, and a margin of error of 5%, assuming a population proportion of .5, and unlimited population size. Given that z for a 95% confidence level is 1.96 from the z-table. Substituting the formula;

$$\mathrm{N} = \frac{1.96^2 \mathrm{x}\ 0.5(1-0.5)}{0.05^2}$$

Kathuri and Pals (1993) recommend a minimum sample of 100 respondents therefore a sample of 384 was appropriate to take care of any attrition. Proportionate stratified sampling was used in this study to get 16 schools in the categories of National & Extra-County, County and Sub-County schools as shown in Table 1.

Table 1

Sample of Students Included in the Study from Different Categories of Schools (n = 384)

School Type	Number of Schools	Total Agriculture Students	Number of Schools Sampled	Sample Size
National & Extra-County	26	442	2	48
County	25	431	2	48
Sub-County	163	2,817	12	288
Total	**214**	**3,690**	**16**	**384**

From the 214 schools in the County, only 16 (2 National & Extra-County, 2 County and 12 Sub-County) were picked by stratified random sampling to provide the sample for this study. The schools were then assigned into experimental and control groups through simple random sampling where 1 National & Extra-County school, 1 County school and 6 Sub-County schools were placed in each of the categories. It was of necessity to have subjects assigned to experimental and control groups obtained from different schools so that the risk of mixing of members could be contained. This also helped to avoid diffusion of information about the programme to respondents who were not taking part in SAEP (control group). The study was done in 16 secondary schools out of the 214 available in Migori County. The respondents were assigned to the two groups as shown in Table 2.

Table 2

Assignment of Respondents into Experimental and Controls Groups (n = 384)

Group type	Frequency	Percent
Experimental	192	50.0
Control	192	50.0
Total	**384**	**100.0**

Instrumentation and Data Collection

A test in Likert scale was used to measure perception about profitability of practical agricultural activities.

A pre-test was administered using learning outcome tests to collect relevant data on the perception about profitability of practical agricultural activities. The respondents were given 20 minutes to complete the questionnaire and the learning outcome test after which the researcher collected them.

The control group was taught about the coriander crop through conventional classroom methods which covered the areas concerning the field production of the crop. This took one month of classroom instruction. The experimental group was subjected to a SAEP lasting for 4 months where they were instructed about coriander crop and monitored in a treatment condition of growing and managing the crop from the point of land preparation, planting, field management and disposal.

Appropriate site on the school land was selected under the guidance of the teacher upon which land preparation was done by the students using simple tools and equipment available within the school. One of the plots being prepared for planting is shown in Figure 1.

Figure 1

Students preparing land for planting of coriander at Ageng'a Mixed Secondary School in Nyatike Sub County, Migori County.

During the growing period, the experimental group was instructed and observed following the SAEP guidelines including carrying out proper management practices and appropriate record keeping. The students were further given instructions on how to take care of the crop including carrying out agronomic practices like watering in the evenings during the days when there was no rainfall, weeding and pest and disease management.

Figure 2

A section of coriander plot at Masara Mixed Secondary School in Suna West Sub-County, Migori County

At the end of the experiment, the respondents harvested the produce and were given opportunity to dispose them at their pleasure. Some respondents sold, while others took them home to be used by the families.

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Coriander crop ready for harvesting is shown in Figure 3.

Figure 3

A section of coriander crop ready for harvesting at Sori Boys' Secondary School in Nyatike Sub-County, Migori County

A post-test to measure differences in knowledge in Agriculture content, attitude towards practical Agriculture, perception about profitability of practical agricultural activities and difference in the level of interest in studying Agriculture post-secondary school and perception about Agriculture-related careers among secondary school Agriculture students who took part in SAEP and those who did not take part was then administered to both the experimental and control groups to see if differences existed in learning outcomes between the two groups.

Data Analysis

The collected data was first cleaned up for any errors such as incompleteness or inaccuracy in marking of responses. Data was then coded and recorded to reduce mass for ease of analysis. Data was then entered into the computer for analysis using Statistical Packages for Social Sciences (SPSS) Version 22.0.

Data on the hypothesis was measured as indices generated from respondent's score in the 9 items, each with a minimum score of 1 and a maximum of 5. The maximum score for the student's perception about profitability of Agriculture was an index of 5 implying that the higher the score, the more positive the perception. The indices were obtained by dividing the total scores in all items by 9. This was interpreted as: 1.0-1.84 = very negative perception, 1.85-2.64 = negative perception, 2.65-3.44 = neutral perception, 3.45-4.24 = positive perception and 4.25-5.00 = very positive perception.

Data was analyzed using both descriptive and inferential statistics. Data was presented and described using frequencies, percentages, means and standard deviations. The inferential statistics was used at the .05 level for significance. One-way ANOVA, Tukey's post hoc, paired sample t-test and independent sample t-test were used to determine the difference in perception about profitability of practical agricultural activities among secondary school Agriculture students involved in commercialized SAEP and those that were not involved.

Results and Discussion

Agriculture Venture Is Expensive to Me Because It Attracts a Lot of Inputs

The study sought to determine the respondents' perception on the cost of agricultural ventures and the results are shown in Table A_1. From the table, before taking part in the SAEP, 26.6% of the respondents in the experimental group strongly agreed to the idea that Agriculture is expensive because it attracts a lot of inputs while 22.4% disagreed that Agriculture is expensive because it attracts a lot of inputs. Furthermore, 18.8% were undecided, 16.1% agreed while another 16.1% of the respondents taking part strongly agreed that Agriculture is expensive because it attracts a lot of inputs. After the SAEP, about a quarter (25.5%) of the respondents was strongly against the idea that Agriculture is expensive because it attracts a lot of inputs while 20.3% disagreed to the same. Another 16.7% were undecided while about a quarter (24.5%) agreed, with a small proportion of 13.0% strongly agreeing that Agriculture is expensive because it attracts a lot of inputs. This was an indication of a

mean of 2.73 and 2.79 for the pre-test and post-test respectively, showing a very small increase.

Before the SAEP, 15.6% of the respondents in the control group strongly disagreed that Agriculture is expensive because it attracts a lot of inputs, about a quarter (24.5%) disagreed and another 18.8% were undecided. In the same control group, 23.4% agreed while 17.7 strongly agreed that Agriculture is expensive because it attracts a lot of inputs. After the SAEP, 14.4% strongly disagreed, about a quarter (25.5%) disagreed, 20.3% were undecided, 21.9% agreed while 17.7% strongly agreed that Agriculture is expensive because it attracts a lot of inputs, giving a mean of 3.03 and 3.03 for pre-test and post-test respectively indicating no change in perception.

This concurs with the findings by Nwaogwugwu and Obele (2017) that looked at factors limiting rural Agriculture youths' participation in Agriculture and concluded that poor social factors, poor agricultural extension services and policies, inadequate arable land are the limiting factors but not farm inputs. This is also supported by Nnadi and Akwizu (2008), who found out that the involvement of youths in Agriculture is majorly determined by their ages, marital status, youth dependence status, parental income and size of their rural households.

Net Farm Income from Agriculture is High

The respondents were asked to indicate their perception regarding the income obtained from Agriculture and the results are shown in Table A_1. From the table, it can be seen that prior to the SAEP, 26.6% of the respondents in the experimental group strongly agreed that net farm income from Agriculture is high while 13.0% disagreed. Furthermore, 14.1% were undecided, 21.9% agreed while only 1.6% strongly agreed that net farm income from Agriculture is high. After the SAEP, 26.6% of the respondents strongly opposed the idea that net farm income from Agriculture is high while 10.9% disagreed to that thought. It can also be seen that 22.4% were undecided while about a fifth (20.8%) agreed, while almost the same proportion (19.3%) strongly supported it. This was pre-test mean of 3.66 and a post-test mean of 3.56 showing a small decline in perception.

Before the SAEP, 15.1% of the respondents in the control group strongly disagreed, 12.5% disagreed, 10.4% were undecided, 34.4% agreed while 27.6% strongly agreed that the net farm income from Agriculture. Thereafter, 14.1% strongly disagreed, 14.1% disagreed, 10.4% were undecided, 34.9% agreed while 26.6% strongly agreed that net farm income from Agriculture is high, giving averages of 3.47 and 3.46 for pre-test and post-test respectively indicating a small decline in perception on the statement that net farm income from Agriculture is high.

Labour Costs in Farming are Relatively Lower Than Other Business Ventures

Agricultural ventures involve labour as a cost. The participants were consequently asked to give their opinion on whether the labour costs in farming are relatively lower compared to other business ventures and the results are as shown in Table A_1. It can be seen that prior to the SAEP, 7.8% of the respondents in the experimental group strongly disagreed that the labour costs in farming are relatively lower compared to other business ventures while 37.0% disagreed. Again, 13.0% were undecided, 18.8% agreed while about a quarter (23.4%) strongly agreed that the labour costs in farming are relatively lower compared to other business ventures. After the SAEP, 5.2%, a third (33.3%), 24.0%, 16.1% and 21.4% strongly disagreed, disagreed, were undecided, agreed and strongly agreed that the labour costs in farming are relatively lower, showing a pre-test mean of 2.87 and a post-test mean of 2.85 showing a minimal decline in perception.

Before the SAEP, 6.8% of the respondents in the control group strongly disagreed, 36.5% disagreed, 13.0% were undecided, 18.8% agreed while a quarter (25.0%) strongly agreed that the labour costs in farming are

relatively lower. Thereafter, 6.3% strongly disagreed, 36.5% disagreed, 13.5 were undecided, 18.8% agreed while a quarter (25.0%) strongly agreed that the labour costs in farming are relatively lower, showing very little variation in perception at a pre-test and post-test mean of 2.81 and 2.80 respectively. It can be seen that in both cases, there was a decline in perception about labour costs with the experimental group notably recording a decline of 0.02, which could be attributed to that fact that after taking part in SAEP, a few students had the feeling that labour was relatively higher than other ventures.

Opinion on Whether Respondent can Engage in Farming as a Fulltime Business

Agriculture can be done as a full-time business if the persons doing it take it seriously. The participants were hence asked to give their opinion on whether they can practice Agriculture as a full-time business and the results are as shown in Table A_1. It shows that prior to the SAEP, 2.1% of the respondents in the experimental group strongly disagreed that they can practice Agriculture as a full-time business while 30.7% disagreed. It can further be reported that 17.7% were undecided, a third (33.3%) agreed while 16.1% strongly agreed to the same. After the programme, 2.1%, 30.7%, 16.7%, 39.1% and 11.5% strongly disagree, disagreed, were undecided, agreed and strongly agreed respectively that they can practice Agriculture as a full-time business, revealing a pre-test mean of 3.31 and a post-test mean of 3.27 showing a minimal decline in perception that they can practice Agriculture as a full-time business.

Before the SAEP, 8.9% of the respondents in the control group strongly disagreed, 10.4% disagreed, 21.9% were undecided, 42.2% agreed while 16.7% strongly agreed that they can practice Agriculture as a full-time business. Afterwards, 8.9% were strongly in disagreement, 10.4% in disagreement, 21.1 were undecided, 43.2% in agreement while 16.1% were strongly in agreement that they can practice Agriculture as a full-time business, showing same pre-test and post-test indices of 3.47 and 3.47 respectively. This showed a more or less the same trend for experimental and control groups. These findings concur with that of Omotesho *et al.* (2017) that revealed that the students had a more negative perception of self-employment in Agriculture, a perception that was attributed to socio-economic features which could be used in enhancing a more positive perception among the respondents. For this reason, very few were willing to fully engage in Agriculture as a self-employment activity.

Opinions on Whether Operating Profit Margin from Farming is High

Agriculture can be done as an enterprise that generates profits to the persons practicing it. The participants were hence asked to give their opinion on whether the operating profit margins are high and the results are what are shown in Table A_1. It shows that prior to the SAEP, 4.7% of the respondents in the experimental group strongly disapproved the opinion that the operating profits margins from farming are high while 12.5% disagreed. It is further reported that 18.8% were undecided, 40.1% agreed while 24.0% strongly agreed that operating profits margins from farming are high. After the programme, 4.2%, 10.9%, 17.7%, 47.4% and 19.8% strongly disagreed, disagreed, were undecided, agreed and strongly agreed in that order that operating profits margins from farming are high, giving high a pre-test mean of 3.66 and a high post-test mean of 3.68 showing a minimal increase in perception that operating profits margins from farming are high.

Before the SAEP, 8.3% of the respondents in the non-experimental group strongly disagreed, 7.8% disagreed, 18.2% were undecided, 43.2% agreed while 22.4% strongly agreed that operating profit margin from farming is high. In the period following the SAEP, 8.3% were strongly in disagreement, 7.8% in disagreement, 19.3% were undecided, 42.7% in agreement while 21.9% were strongly in agreement that they can practice Agriculture as a full-time business, showing an

almost similar high pre-test and post-test indices of 3.64 and 3.62 respectively. This showed a similar trend for experimental and control groups. The profit margins obtained after an agricultural venture can be used to measure the profitability of any farm business by the farmer. This is contrary to Iddrisu (2018) findings that pointed out Agriculture s the most lucrative business for the unemployed youth and when they engage with the right mind-set, they can come out of poverty.

Farming can be Done for More than Home Consumption Only

The Form Three Agriculture students were required to indicate if farming can be done to cater for more than what is consumed at home. Participants in this study were needed to indicate their opinion regarding this and the outcome is shown in Table A_1. It clearly indicates that prior to the programme, 15.1% of the respondents in the experimental group strongly disagreed that farming can be done to meet more than what is consumed at home while 27.6% disagreed. It is also seen that 31.3% were undecided, 11.5% agreed while 14.5% strongly agreed that farming can be done for more than just home consumption. After the programme, 13.6%, 18.2%, 27.6%, 27.1% and 13.5% strongly disagreed, disagreed, were undecided, agreed and strongly agreed respectively, that farming can be done to meet more than what is consumed at home, giving moderate pre-test mean of 2.80 and a low post-test mean of 2.55 showing that the perception reduced marginally as a result of the SAEP.

Focusing on the control group, before the SAEP, 16.8% of the respondents strongly disagreed, 22.5% disagreed, 29.8% were undecided, and 14.2% agreed while 16.7% strongly agreed that farming can be done to meet more than what is consumed at home. In the period after, 16.7% were strongly in disagreement, 20.8% in disagreement, 25.0% were undecided, 15.6% in agreement while 21.9% were strongly in agreement that farming can be done to meet more than what is consumed at home, showing an almost similar low pre-test and post-test indices of 2.63 and 2.63 respectively. The pre-test and post-test results from the two groups show that there was no major change in either group after the SAEP, but a minor decline in perception among participants in the experimental group. This implies that the students did not come to appreciate that Agriculture can be done for more than just home consumption as a result of the venture.

Farming can be Done to Meet the Market Demands of Agricultural Goods

The respondents were asked to indicate if farming can be done to meet market demand of agricultural goods. The result is shown in Table A_1. It is shown that ahead of the programme, 10.4% of the respondents in the experimental group strongly disagreed that farming can be done to meet the market demand of agricultural goods while 16.1% disagreed. Moreover, 4.7% were undecided, 38.5% agreed while 30.2% strongly agreed that farming can be done to meet the market demand of agricultural goods. In the post-test period, 10.4%, 14.1%, 4.7%, 46.4% and 23.4% strongly disagreed, disagreed, were undecided, agreed and strongly agreed respectively, that farming can be done to meet the market demand of agricultural goods, with a high pre-test mean of 3.90 and a high post-test mean of 3.89 showing that the perception reduced insignificantly as following the SAEP.

Looking at the control group before the SAEP, 12.0% of the respondents strongly disagreed, 19.8% disagreed, 4.7% were undecided, 37.5% agreed while 26.0% strongly agreed farming can be done to meet the market demand of agricultural goods. In the period following SAEP, 12.0% were strongly in disagreement, 19.8% in disagreement, 5.2% were undecided, and 39.0% in agreement while 24.0% did strongly agree farming can be done to meet the market demand of agricultural goods. These were high pre-test and post-test indices of 3.46 and 3.43 accordingly.

A Farmer has More Quality Food for Consumption than Urban Dwellers

Most agricultural activities are done in rural areas hence the farmers are expected to have better quality food compared to urban dwellers. The result displayed in Table A_1 shows the respondents' opinion regarding the idea that a farmer has more and better-quality food for consumption than urban dwellers. It is shown that ahead of the programme, 18.8% of the respondents in the experimental group strongly disagreed that a farmer has more and better-quality food for consumption than urban dwellers while 19.8% disagreed. Moreover, 13.0% were undecided, 20.8% agreed while 27.6% strongly agreed. In the after-test period, 18.2%, 19.3%, 13.0%, 18.8% and 30.7% strongly disagreed, disagreed, were undecided, agreed and strongly agreed respectively, that a farmer has more and better-quality food for consumption than urban dwellers, with a moderate pre-test index score of 3.19 and a moderate post-test index score of 3.25 showing that the perception reduced marginally following the SAEP.

Now looking at the control group before the venture, 8.3% of the respondents were in strong disagreement, 22.4% in disagreement, 17.7% were undecided, 19.3% were in agreement while 32.3% were in strong agreement that a farmer has more and better-quality food for consumption than urban dwellers. In the period after the SAEP, 8.3% were strongly in disagreement, 22.4% in disagreement, 18.2% were undecided, and 19.3% in agreement while 31.8% did strongly agree that a farmer has more and better-quality food for consumption than urban dwellers. These showed high pre-test and post-test indices of 3.46 and 3.44 in the order listed.

Idea on Profitability of Farming

Farming can be done to earn an income but most significantly to bring profits especially if one chooses to venture into commercial farming. The result displayed in Table A_1 indicates the respondents' feelings regarding the profitability of farming and agricultural activities in general. The data shows that before the programme, 16.1% of the respondents in the experimental group strongly disagreed that farming is very profitable while 2.6% disagreed. Moreover, about a quarter (25.5%) of them was undecided, 18.8% agreed while 37.0% strongly agreed that farming is very profitable. In the after-test period, 16.1%, 2.6%, a quarter (25.0%), 16.1% and 40.1% strongly disagreed, disagreed, were undecided, agreed and strongly agreed in that order, that farming is very profitable, giving a high pre-test index of 3.58 and a high post-test index of 3.61 showing that the perception increased marginally following the SAEP.

For the control group before the SAEP, 21.9% of the respondents were in strong disagreement, 3.6% in disagreement, 11.5% were undecided, 23.4% were in agreement while 39.6% were in strong agreement that that farming is very profitable. In the period after the SAEP, 21.9% were strongly in disagreement, 3.6% in disagreement, 13.0% were undecided, and almost a quarter (24.5%) agreed while 31.8% strongly agreed that a that farming is very profitable. These revealed high pre-test and post-test indices of 3.55 and 3.51 in the order listed.

Testing of Hypothesis on Students' Perception About Profitability of Practical Agricultural Activities

The objective of the study was to find out the difference in perception about profitability of practical agricultural activities between secondary school Agriculture students exposed to SAEP and those not exposed to SAEP. To clearly determine this, a null hypothesis was formulated that: there is no statistically significant difference in perception about profitability of practical agricultural activities between secondary school Agriculture students exposed to SAEP and those not exposed to SAEP. To test the hypothesis, a one-way ANOVA, a paired sample t-test and an independent sample t-test were computed at 95% confidence level. The results are presented in Tables 3, 4, 5, 6 and B_1.

Mean Index of Students' Perception About Profitability of Practical Agriculture

Nine test items were used to measure the student's perception about profitability of practical agricultural activities. The mean index score from these items is summarized as shown in Table 3.

Table 3

Group Statistics for Change in Perception about Profitability of Practical Agricultural Activities

Category	Indicator	Group statistics			
		n	mean	Std. deviation	Std. error mean
Experimental	Perception about profitability Agricultural activities before SAEP	192	3.2321	.99736	.07198
	Perception about profitability of Agricultural activities after SAEP	192	3.2610	1.00640	.07263
	Mean Difference (Change in perception)		.00279	.00904	
Control	Perception about profitability of Agricultural activities before SAEP	192	3.2494	.76329	.05509
	Perception about profitability of Agricultural activities after SAEP	192	3.2494	.76329	.05509
	Mean Difference (Change in perception)		.0000	.0000	

As can be seen from Table 3, the experimental group had a group mean of 3.23 (*SD* = 0.99) and a standard error of the mean of .07 in Agriculture before the SAEP. This mean is interpreted as moderate. However, after the SAEP, the group had a mean of 3.26 (*SD* = 1.01) and a standard error of the mean of .07 in perception about profitability of Agriculture. This mean is interpreted as moderate. For the control group, mean of 3.25 (*SD* = 0.76) and a standard error of the mean of .055 before the SAEP. This mean is also interpreted as moderate. After the SAEP, this group had a mean of 3.25 (*SD* = 0.76) and a standard error of .06 in perception about profitability of Agriculture. The mean is also interpreted as moderate. It can be said that the perception about profitability of Agriculture remained the same before and after SAEP among the two groups, to mean that SAEP did not impact on the respondents' perceptions of profitability of practical agricultural ventures.

This is contrary to the findings from the study by Mwangi (2015) which looked at how Kenyan schools have designed ways to make Agriculture attractive to the youths and reports that commercialization of student's farming ventures had indeed increased interest in Agriculture for the students. In many schools, the study reports, learners are allowed to self-own plots on which they cultivate vegetables such as cabbages, carrots or tomatoes which are consequently sold to the school or to neighbouring communities to earn them some income. The findings also are contrary to those of Saliu et al. (2016) which on studying about perceptions of agricultural students on careers found out that functional agricultural education programme can largely influence the student's choice of farming to self-employment and sustainability. This implies that using special programmes like SAEP does not change perception of agriculture students about profitability of agriculture.

One-way ANOVA Test for Differences in Perception About Profitability of Practical Agricultural Activities

A one-way ANOVA test was conducted to illustrate the significant differences within the groups as well as to show the group with significant increase in perception towards profitability of practical agricultural activities. The results are shown in Table 4.

Table 4

Post SAEP ANOVA Results for the Difference in Means of Perception about Profitability of Practical Agriculture

		Sum of Squares	df	Mean Square	F	Sig.
Experimental	Between Groups	2.380	7	.340	1.889	.074
	Within Groups	33.118	184	.180		
	Total	35.498	191			
Control	Between Groups	20.534	7	2.933	5.948	.001
	Within Groups	90.743	184	.493		
	Total	**111.278**	**191**			

Data for the group taking part in SAEP showed that each school had 24 respondents and the respondents from Masara showed a mean perception in profitability practical agricultural activities of 3.24 (*SD* = 0.02); the participants from Nyango had a mean of 3.18 (*SD* = 0.80); those from Sori had a mean of 3.30 (*SD* = 0.58); ones from Nyamome had a mean of 3.22 (*SD* = 0.64); the participants from Tuk Jowi had a mean of 3.26 (*SD* = 0.79); those from Agenga had a mean of 3.31 (*SD* = 1.39); Kubweye's had a mean of 3.31 (*SD* = 1.39); while the ones from Nyamuga had a mean of 3.27 (*SD* = 1.33). The difference in perception towards profitability practical agricultural activities among the 8 schools, therefore, was statistically insignificant, $F(7, 184) = 1.89$, $p = .074$.

The control group involved in SAEP showed that each school had 24 respondents and the respondents from Abwao showed a mean perception in practical Agriculture of 2.81 (*SD* = 1.03); those from Kakrao had a mean of 2.95 (*SD* = 0.74); ones from Akala had a mean of 3.52 (*SD* = 0.66); Moi Suba participants had a mean of 3.53 (*SD* = 0.66); the participants from Bishop Okinda had a mean of 3.39 (*SD* = 0.67); the participants from Onyalo had a mean of 2.75 (*SD* = 0.41); the ones from Nyarach had a mean of 3.52 (*SD* = 0.66); while those from Nyikendo had a mean of 3.52 (*SD* = 0.66). The difference in perception towards profitability practical agricultural activities, therefore, was significant, $F(7, 184) = 5.95$, $p = .001$. These findings showed that the schools taking part in SAEP had means that were not statistically different. It also affirmed that the schools not taking part in SAEP had means that were not significantly far apart.

Paired Sample T-Test for Group Differences in Perception About Profitability Practical Agricultural Activities

A paired sample-test test was conducted to show the level of differences in perceived profitability of practical Agriculture. This was done by comparing pre-SAEP and post-SAEP means in each group. The results are shown in Table 5.

Table 5

Paired Sample T-test Results for the Differences in Perception about Profitability of Practical Agricultural Activities between Experimental and Control Groups

		Mean	Std. Deviation	Std. Error Mean	t	Df	Sig. (2-tailed)
Experimental	Perception about profitability before average –after average	.00279	-.94189	-.06798	1.19821	191	.093
Control	Perception about profitability before average –after average	.00000	00000	00000	00000	191	

From Table 5, it can be reported that both groups taking part in SAEP had very little positive change in the mean in perception towards profitability of practical Agriculture while their control group counterparts giving no difference in the pre-SAEP and post-SAEP means. The experimental group mean increase in perception was therefore not statistically significant, $t(191) = 1.20$, $p = .093$., while for the control group, there was no change at all. This implies that SAEP does not have any significant effect on how students perceive profitability of agriculture.

Independent Sample T-Test for Differences in Perception About Profitability of Practical Agricultural Activities Between Experimental and Control Groups

To determine if there were differences in perception to wards profitability of practical Agriculture between the two study groups, an independent sample t-test was d one, and the results are as shown in Table 6.

Table 6

Independent Sample T-Test for The Differences in Perception About Profitability of Practical Agriculture

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Dif.	Std. Error Diff
Overall perception before SAEP	Equal variances assumed	3.255	.072	-.192	382	.848	-.01736	.09064
	Equal variances not assumed			-.192	357.589	.848	-.01736	.09064
Overall perception after SAEP	Equal variances assumed	5.268	.022	.127	382	.899	.01157	.09116
	Equal variances not assumed			.127	356.105	.899	.01157	.09116

A pre-test was done to ascertain that the means between the experimental and control groups before the programme was implemented were equal. As can be seen from Table 6, pre-test independent sample t-tests revealed that the group means for experimental ($M = 3.23$, $SD = 0.99$) and control ($M = 3.25$, $SD = 0.76$) were not statistically different, $t(382) = -0.19$, $p = .848$, on the perception about profitability of practical agricultural activities. Post-SAEP t-test also showed that there no statistically significant difference in students' perception about profitability of practical agricultural activities between the experimental ($M = 3.26$, $SD =$

1.01) and control (M = 3.25, SD = 0.76) groups, $t(356.11) = 0.13$, $p = .899$.

This therefore shows that after the SAEP, there was no significant change in perception about profitability of practical agricultural activities between students taking part and those not taking part. Therefore, the null hypothesis that there is no statistically significant difference in perception about profitability of practical agricultural activities between secondary school Agriculture students exposed to SAEP and those not exposed to SAEP is accepted.

Conclusion

From the findings, it was concluded that secondary school Agriculture students taught agriculture through SAEP did not have more positive perception about profitability of practical agricultural activities compared to those not taking part in SAEP, therefore the programme did not have an influence on student's perception about profitability of practical agricultural activities. Therefore, when schools want to change how learners perceive the profitability of agriculture, other alternative methods could be adopted.

Recommendation

The study clearly revealed that students still hold the high belief that Agriculture is not profitable. Therefore, studies could be done to find out how to make Agriculture more profitable so that more youths can engage in farming for commercial purposes.

Author Contribution

Peter Odhiambo Ongang'a[1]: Conceptualization, Software, Formal analysis, Funds acquisition, Investigation, Methodology, Writing of Draft, Project Administration.

Evans Abenga Basweti[2]: Methodology, Project administration, Writing – review & editing.

Judith Achieng Odhiambo[3]: Conceptualisation, Investigation, Validation, Writing – review & editing.

Washington Ochola Adede[4]: Conceptualisation, Investigation, Validation, Writing – review & editing.

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Appendix A: Data results for the learning outcome

Table A_1. Data on Perception About Profitability of Agriculture

Timing	Category	Question and Score												Mean
		SD		D		U		A		SA		Total		
		f	%	f	%	f	%	f	%	f	%	f	%	
		Question: Agriculture venture is expensive because it attracts a lot of inputs												
Pre-experiment	Experimental	51	26.6	43	22.4	36	18.8	31	16.1	31	16.1	192	100.0	2.7292
	Control	30	15.6	47	24.5	36	18.8	45	23.4	34	17.7	192	100.0	3.0313
Post-experiment	Experimental	49	25.5	39	20.3	32	16.7	47	24.5	25	13.0	192	100.0	2.7917
	Control	28	14.6	49	25.5	39	20.3	42	21.9	34	17.7	192	100.0	3.0260
		Question: Net farm income from Agriculture is high												
Pre-experiment	Experimental	51	26.6	25	13.0	27	14.1	42	21.9	3	1.6	192	100.0	3.6563
	Control	29	15.1	24	12.5	20	10.4	66	34.4	53	27.6	192	100.0	3.4688
Post-experiment	Experimental	51	26.6	21	10.9	43	22.4	40	20.8	37	19.3	192	100.0	3.5625
	Control	27	14.1	27	14.1	20	10.4	67	34.9	51	26.6	192	100.0	3.4583
		Question: Labour costs in farming are relatively lower than other business ventures												
Pre-experiment	Experimental	15	7.8	71	37.0	25	13.0	36	18.8	45	23.4	192	100.0	2.8698
	Control	13	6.8	70	36.5	25	13.0	36	18.8	48	25.0	192	100.0	2.8125
Post-experiment	Experimental	10	5.2	64	33.3	46	24.0	31	16.1	41	21.4	192	100.0	2.8490
	Control	12	6.3	70	36.5	26	13.5	36	18.8	48	25.0	192	100.0	2.8021
		Question: I can engage in farming as a fulltime business venture												
Pre-experiment	Experimental	4	2.1	59	30.7	34	17.7	64	33.3	31	16.1	192	100.0	3.3073
	Control	17	8.9	20	10.4	42	21.9	81	42.2	32	16.7	192	100.0	3.4740
Post-experiment	Experimental	4	2.1	59	30.7	32	16.7	75	39.1	22	11.5	192	100.0	3.2708
	Control	17	8.9	20	10.4	41	21.4	83	43.2	31	16.1	192	100.0	3.4740

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		Question: Operating profit margins from farming is high												
Pre-experiment	Experimental	9	4.7	24	12.5	36	18.8	77	40.1	46	24.0	192	100.0	3.6615
	Control	16	8.3	15	7.8	35	18.2	83	43.2	43	22.4	192	100.0	3.6354
Post-experiment	Experimental	8	4.2	21	10.9	34	17.7	91	47.4	38	19.8	192	100.0	3.6771
	Control	16	8.3	15	7.8	37	19.3	82	42.7	42	21.9	192	100.0	3.6198
		Question: Farming can be done for more than home consumption only												
Pre-experiment	Experimental	29	15.1	53	27.6	60	31.3	22	11.5	28	14.5	192	100.0	2.8021
	Control	32	16.8	43	22.5	57	29.8	27	14.2	32	16.7	192	100.0	2.6354
Post-experiment	Experimental	26	13.6	35	18.2	53	27.6	52	27.1	26	13.5	192	100.0	2.5469
	Control	32	16.7	40	20.8	48	25.0	30	15.6	42	21.9	192	100.0	2.6250
		Question: Farming can be done to meet the market demands of agricultural goods												
Pre-experiment	Experimental	20	10.4	31	16.1	9	4.7	74	38.5	58	30.2	192	100.0	3.9010
	Control	23	12.0	38	19.8	9	4.7	72	37.5	50	26.0	192	100.0	3.4583
Post-experiment	Experimental	20	10.4	27	14.1	9	4.7	89	46.4	45	23.4	192	100.0	3.8854
	Control	23	12.0	38	19.8	10	5.2	75	39.0	46	24.0	192	100.0	3.4323
		Question: A farmer has more and better-quality food for consumption than the people living in urban areas												
Pre-experiment	Experimental	36	18.8	38	19.8	25	13.0	40	20.8	53	27.6	192	100.0	3.1875
	Control	16	8.3	43	22.4	34	17.7	37	19.3	62	32.3	192	100.0	3.4479
Post-experiment	Experimental	35	18.2	37	19.3	25	13.0	36	18.8	59	30.7	192	100.0	3.2448
	Control	16	8.3	43	22.4	35	18.2	37	19.3	61	31.8	192	100.0	3.4375
		Question: I believe farming is very profitable												
Pre-experiment	Experimental	31	16.1	5	2.6	49	25.5	36	18.8	71	37.0	192	100.0	3.5781
	Control	42	21.9	7	3.6	22	11.5	45	23.4	76	39.6	192	100.0	3.5521
Post-experiment	Experimental	31	16.1	5	2.6	48	25.0	31	16.1	77	40.1	192	100.0	3.6146
	Control	42	21.9	7	3.6	25	13.0	47	24.5	71	37.0	192	100.0	3.5104

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