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The Effect of Farm Attachment Programme (FAP) Design Attributes on Experiential Learning Ability among Egerton University Students

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Authors' contributions

This work was carried out in collaboration among all authors. Author NWC designed the study, performed the statistical analysis and wrote the protocol and the first draft of the manuscript. Authors JMO and NWM read and approved the final manuscript. All authors read and approved the final manuscript.

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ABSTRACT

The Farm attachment programme (FAP) of Egerton University was established six years ago to promote learning by "reflection on doing" commonly known as Experiential Learning (EL), among students. However, effectiveness of experiential learning is dependent on possession of certain abilities known as experiential learning abilities (ELAs) including willingness to get actively involved in learning experiences and ability to reflect, analyze, solve problems and make decisions on learnt experiences. Egerton University students' ELAs and FAP design attributes have never been assessed for the purpose of enhancing experiential learning. This study aimed at determining levels ELAs among the students and assessing the effects of FAP design attributes on these abilities. The study adopted a cross sectional survey design targeting a population of 600 students and their host farmers. Systematic random sampling procedure was employed to select 102 students to participate in the survey. A 5-point continuum scale was used to rate gathered indicators to measure ELAs. Descriptive and inferential statistics were used to analyze the data. Students ELA Levels were found

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to be low (M= *2.79, SD = 0.51*). The following FAP design attributes were found to have a significant effect on ELAs: Students' prior agricultural knowledge levels (F (*2.94) = 3.816*), *P* =0.02) with an effect size of 8%, gender (F (*1,96*) = *4.312, P = .037*), with an effect size of 4.4% Students study programme departments, (F (*6,91) =2.652, =.011),* with an effect size of 16.4%, Year of attachment (*F (3,94) =4.206*, *P= .008),* with an effect size of 11.8%. Among the host farmer attributes, income level of the farmer was found to have a significant effect on students' ELAs *(F (2, 94) =3.920, p=.026). FAP* structure and implementation had significant effects on experiential learning ability (F (2,94) =4.309) *P= .016; F (2,94) =8.51, P <.001) and* effect sizes of 8.4% and 13.9% respectively. The results showed that the ELA levels were low among students and certain FAP design attributes had a significant (at 5% level of significance) effect on the learning abilities.

Keywords: Egerton University; farm attachment programme; experiential learning ability; students; host farmers.

1. INTRODUCTION

Globally, universities have been under pressure to produce competent graduates with practical skills and responsive professionals [1]. Higher education is now acknowledged as being pivotal for high level research and technological capacity in the knowledge economy, but it has another fundamental role – that of forming the professionals who will play a major role in a range of services [2]. Research has shown that teaching at the universities frequently relies on lecturing and structured practical lessons. Yet there is no simple relationship between what is taught and what is learnt owing to too little scope for negotiation and construction of meaning [3]. Meaning cannot be simply transferred to students in lectures especially in agriculture. Simply putting more students into universities without adequate attention to the conditions and approaches to learning, reduces the impact of university education, and at worst can waste precious years of young people's lives, dash the high hopes of their families and incur debt [4]. The positive impact of higher education, is not restricted to those who directly study in universities, but can potentially ripple out through the whole society. The Commission for University Education regulations in Kenya require that, for universities to introduce new courses and review existing ones, labour market conditions should be taken into account [5]. In this regard, universities have incorporated internships, field placements and other job-shadowing opportunities in the student's field of interest in their curricula [6].

Field attachment is considered a Job-shadowing (or work shadowing), which is an educational program where university students or other adults can learn about a particular occupation or profession to see if it might be suitable for them [7]. It is a name used to refer to any opportunity given to observe someone doing their job in the workplace [8]. According to [9] job- shadowing is where an individual getting an experience of the role of another individual gains an insight into that particular work area. This helps the individuals who are shadowing to understand the particulars of the job without the commitment of the responsibility. In career development, job shadowing can help to get a better sense of options available and the required competencies for various position options. Since the purpose of field attachment is to produce practically oriented graduates that meet the required job-related competences of their future employers then this attachment serves to create job shadowing for students in addition to gaining unforgettable life experience [10]. Field attachment is organized through six steps namely: Program management, Budgeting, Pre-placement, Placement, Supervision and Evaluation [11].

Egerton University, one of the public universities in Kenya, has established a niche in agricultural education training in Kenya and has developed a field attachment programme that engages the rural communities dubbed as Farm Attachment Programme (FAP) – [12] Students in this programme, pursuing agricultural and community development related courses are hosted by farmers on the same farm(s), continuously for at least three (3) consecutive years [13]. Each cohort of students builds on and follows-up on innovations initiated in the farm by the previous cohorts. Some of the positive impacts of this programme have been that, over 95% of the students attached to farms helped to organize farm operations and initiated record keeping. In the process, students helped farmers to do farm planning and budgeting besides routine activities e.g., correct choice and use of herbicides, pesticides, postharvest storage, and marketing [14]. The stakeholders or the participants in the

programme according to [12] include; the students, host farmers, faculty lecturers, the agricultural extension officers and the board of undergraduate studies (BUGs) which organizes and coordinates the FAP programme. The aim of FAP, according to [12] is to offer experiential learning to students and give them opportunity to put theory from lectures and practical sessions into practice. Students who participate in FAP are drawn from faculties of Agriculture, Education and Community Studies, Applies Sciences and Veterinary Medicine and Surgery based on existing agricultural-related courses and willingness of students to participate in the program. The program is designed such that students are attached to the same farm (s), continuously for at least three consecutive years. Each cohort of students builds on and follows-up on recommendations of the previous group. The first cohort of students focuses on making a general appraisal of the farm, i.e., identifying the strengths and weaknesses of the farm and making proposals for improvement [12]. The model of Egerton university FAP model is shown in Fig. 1.

Experiential learning is the process of learning through experience, and is more specifically defined as "learning through reflection on doing" [15]. According to [16] four abilities are necessary for effectiveness of experiential learning including: willingness to get actively involved in the learning experience, ability to reflect on learnt experiences, ability to analyze learning experiences, ability to make decisions and solve problems and for the purpose of this study, ability to make continuity arrangements for initiated projects/innovations. Despite efforts by Egerton university to improve on experiential learning through FAP, students' experiential learning abilities have never been quantified for the purpose of enhancement. This study aimed at determining the: (i) levels of ELAs and (ii) effects of Farm Attachment Programme design attributes on experiential learning abilities among Egerton University students. The outcome of the study showed that the ELA levels were low among the FAP students, and certain FAP design attributes had a significant effect on the ELAs.

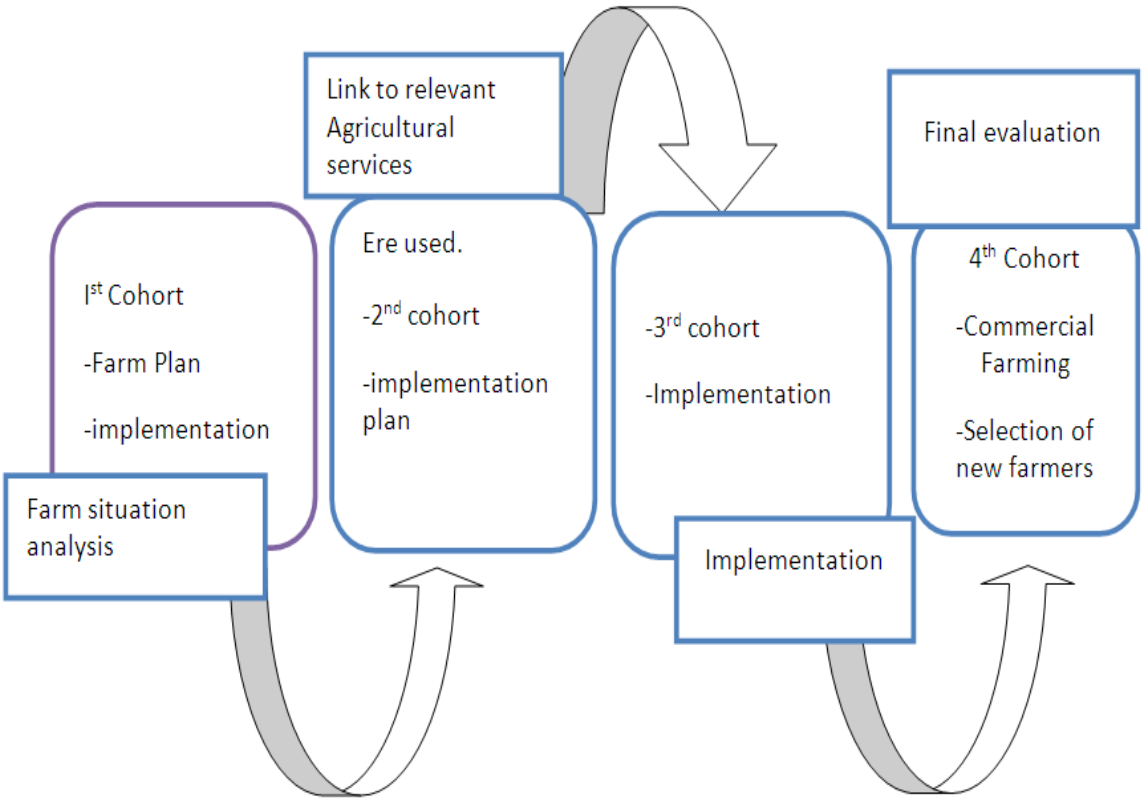

Fig. 1. Egerton University Farm Attachment model (Source: [12])

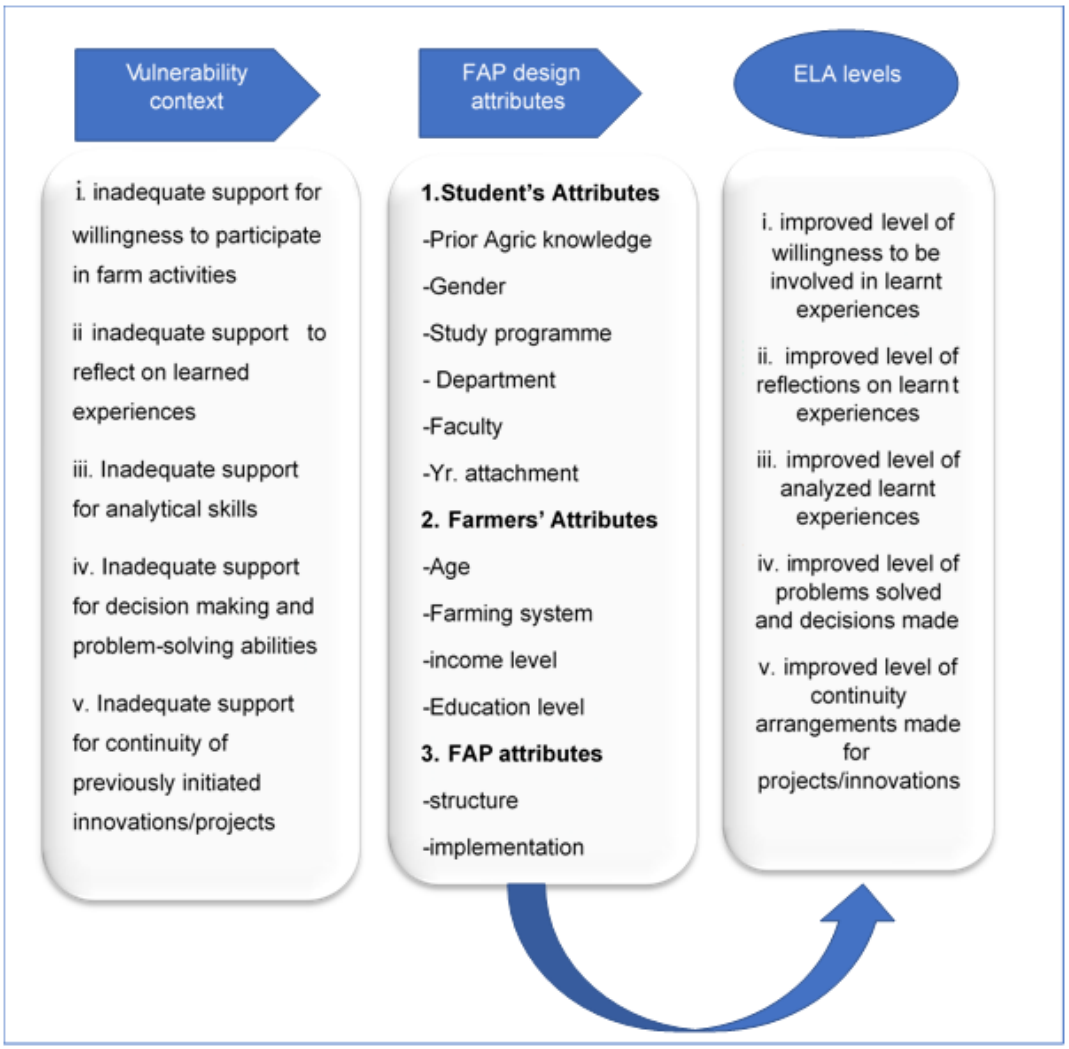

Fig. 2. Conceptual framework showing relationship between different study variables

The findings obtained from this study can be used by the universities to guide policies in curricula development for various study programmes in agriculture. The curricula should consider the FAP design attributes in order to improve the students experiential learning ability levels thus producing more competent professionals with higher employability skills.

This paper is divided into three sections; the methodology which covers the research design and data collection procedures used in this study. The second section deals with the results and discussions. A description of the study sample including the students on FAP of Egerton University, their host farmers and the FAP structure and implementation attributes are presented first. This is followed by the section on results and discussions. In this section sample description is presented followed by an assessment of the FAP design attributes. Determination of the level of Experiential learning ability (ELA) among students on FAP of Egerton University follows and finally the effects obtained on ELAs with each FAP design Attribute are looked into. The paper ends with a conclusion.

2. METHODOLOGY

2.1 Research Design

Survey method which can be defined as a collection of information from a sample of individuals through their responses to questions [17] was used in this research. According to [18], surveys are important in research and have been found to be useful in describing the characteristics of a population under study. Surveys may apply to quantitative research strategies such as using numerical rated items

and open-ended questions as it is often used in exploring human behaviour, it is therefore frequently used in social and psychological research [19]. This study targeted 600 students and their host farmers who had participated in FAP of Egerton University since the programme's inception in 2014. Systematic random sampling technique was used to select 102 survey participants from a sampling frame obtained from Board of Undergraduate Studies (BUGs) of Egerton university. Indicators used to measure ELAs were adopted from [16] after compounding the ratings of constructs used to measure the indicator variables. For example, one of the indicators used to measure experiential learning ability is the willingness to get actively involved in the learning experiences. Three constructs were used to measure this willingness: I) willingness to participate in farm activities like digging, milking, etc. ii) willingness to plan for the jobs and iii) willingness to prepare daily jobsheets for the farm experience to be engaged with. The ratings for the three constructs were compounded and divided by three to give the Experiential willingness index. The same procedure was used to obtain the Experiential reflection index, the Experiential analysis index, the Experiential problem solving and decision-making index and finally the Experiential continuity arrangement index. The five Experiential learning ability indices were then compounded to obtain the Experiential learning ability Index.

2.2 Data Collection

Data was required to measure the FAP design attributes including students, host farmers, and FAP structure and implementation attributes. Data was also necessary for determination of the students' experiential learning ability. Three instruments namely, online google observation proforma, survey questionnaire and Focus Group Discussion topical guides were designed for this purpose. There was need to collect students' data on prior needs in agricultural knowledge during FAP. This data was collected by creating three online google groups for students to ask questions online during FAP. Topics on most frequently asked questions from the students were recorded and considered as knowledge gaps during FAP. Triangulation of this data was done by forming two Focus Group Discussions (FGD) to discuss the knowledge gaps. A semi structured questionnaire was also designed. The questionnaire had many sections. Part one of the questionnaire collected data on demographics of both the student and their host farmers with a rating set on a 5- point continuum scale to measure the FAP design attributes. Students were asked to rate the levels of certain attributes to measure the levels of some FAP design attributes like the prior agricultural knowledge levels and FAP structure and implementation attributes. To determine the levels of experiential Learning Ability (ELA), the students were asked to rate various constructs on a 5-point continuum scale selected to measure the ELA indicators which were adapted from [16]. Initially data was collected using face to face method but the response rate was low and this was discovered during data analysis. There was need to collect more data in 2020 to confirm the results obtained from previously analyzed data by using bigger sample sizes. but this could only be done online due to COVID 19 health protocols that were enforced in the country May 2020.

3. RESULTS AND DISCCUSION

3.1 Sample Description

The following is a detailed description of the FAP design attributes including: students attributes, host farmer attributes including and finally FAP structure and implementation attributes.

3.1.1 Students attributes

The students' attributes that were studied included the gaps in prior agricultural knowledge areas, students' gender, study programme, department, faculty and students' year of FAP. Three online google groups were created to guide in establishing the gaps in knowledge areas. The other attributes' data were collected using the semi structured questionnaire. Observations made from the online google group created to guide in establishing the knowledge areas needed by students during FAP. Figs. 3, 4 and 5 are screenshots of three online google groups created for the students. The groups were given different names: "Shambajuu" online google groups, the farm up internship group and the farm target Israel group respectively. The shambajuu online google group revealed that students wanted information and knowledge mostly from the following agricultural knowledge areas: livestock nutrition, zero grazing, vegetable growing, soil sampling and analysis. Consequently, these areas were chosen as indicators for measuring livestock and crop knowledge areas. The areas in agribusiness mentioned by students in the google groups

included value additions, farm management, input supply, farm records among other areas. In agricultural engineering, the topics were mainly farm tools and equipment, tractor and machinery operations and farm structures. In summary the knowledge areas mentioned by the students were categorized as Livestock, crop, agribusiness/Agricultural economics and agricultural engineering knowledge areas.

The second google platform group, shown in Fig. 4, was given the name "Farm up internship group" which was created for the 2015 September FAP cohort. The recurring topics from the question-and-answer forums were topics like poultry management, especially the indigenous breeds, poultry feeds, formulation of livestock feeds, soil sampling procedures and soil analysis, among other knowledge areas. These knowledge areas were identified as gaps that warranted an intervention. Again, from this online google group the knowledge areas were categorized as livestock, crop, agribusiness/ agricultural economics and agricultural engineering knowledge areas.

The third online google group was "farm Target Israel" google group (see Fig. 5). This title was given to the group because most of the students were very eager to excel and get a chance to carry on their farm attachment endeavors in Israel. Desire to travel to Israel was a limitation in data collection, most students tended to exaggerate the scores when rating variables. They reasoned that the high scores would give them an added advantage when it came to selecting students to travel to Israel, as was a routine in the FAP. However, a lot of triangulations was done by collecting similar data indirectly. Some of the topic areas generated from this google group included milk production and its value addition, livestock nutrition, record keeping, horticultural crops management and poultry feeding among others. The knowledge areas were again categorized as livestock crop, agribusiness/ agricultural economics and agricultural engineering knowledge areas.

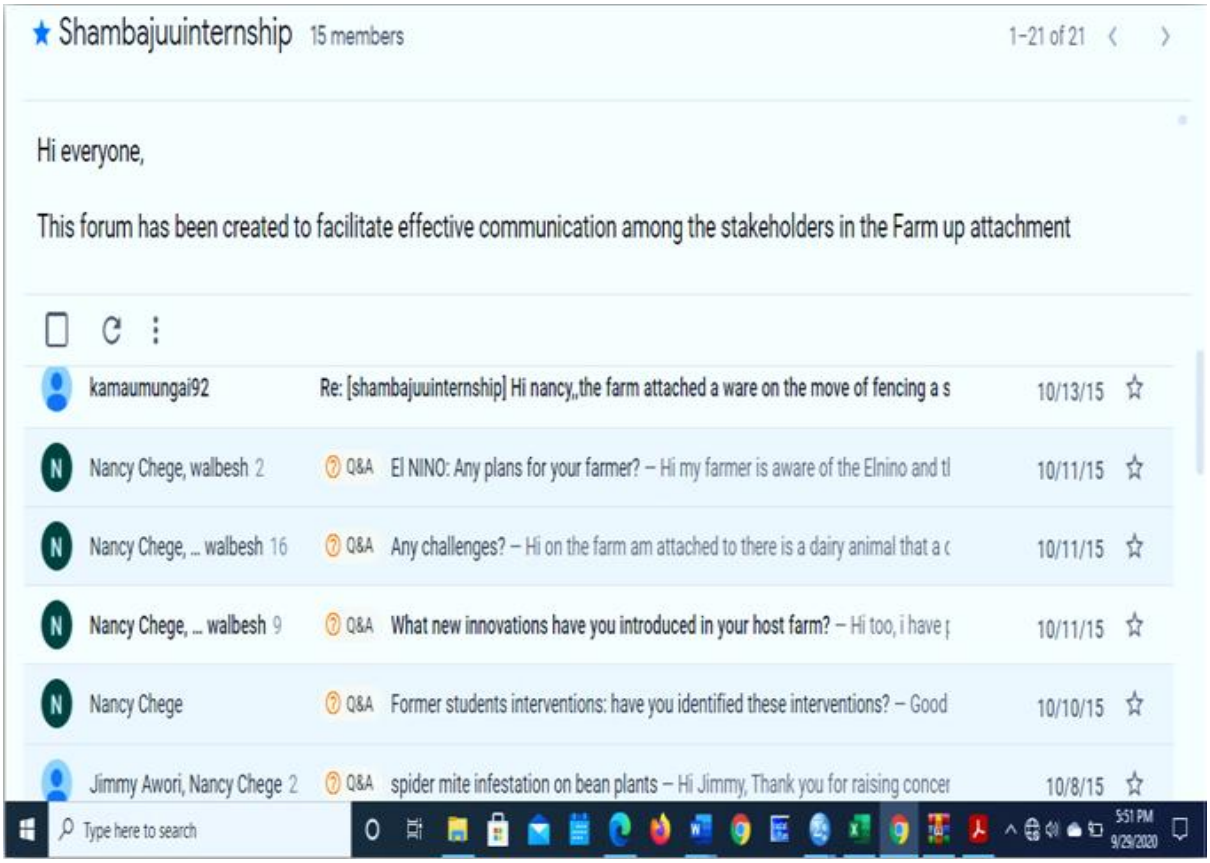

Fig. 3. Screenshot from a conversation from shamba juu internship online FAP forum

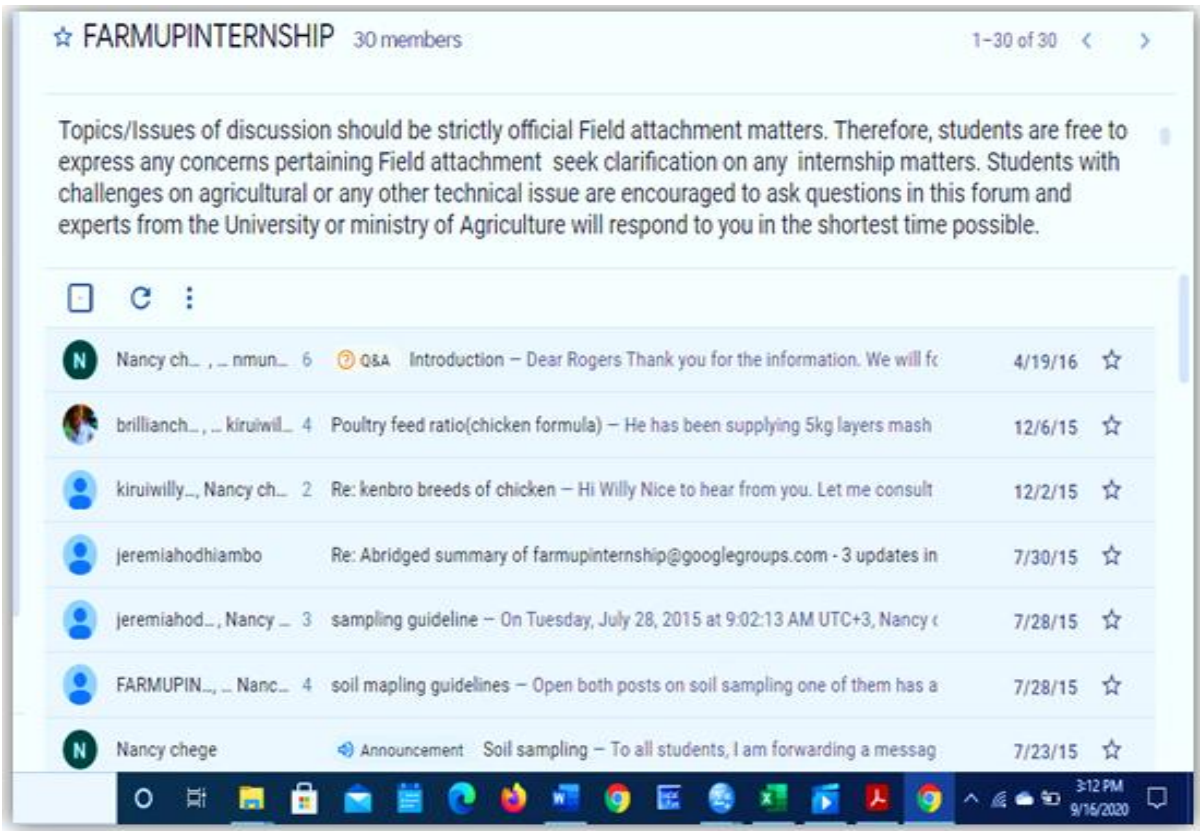

Fig. 4. Screenshot on a conversation from google online group "farm up internship"

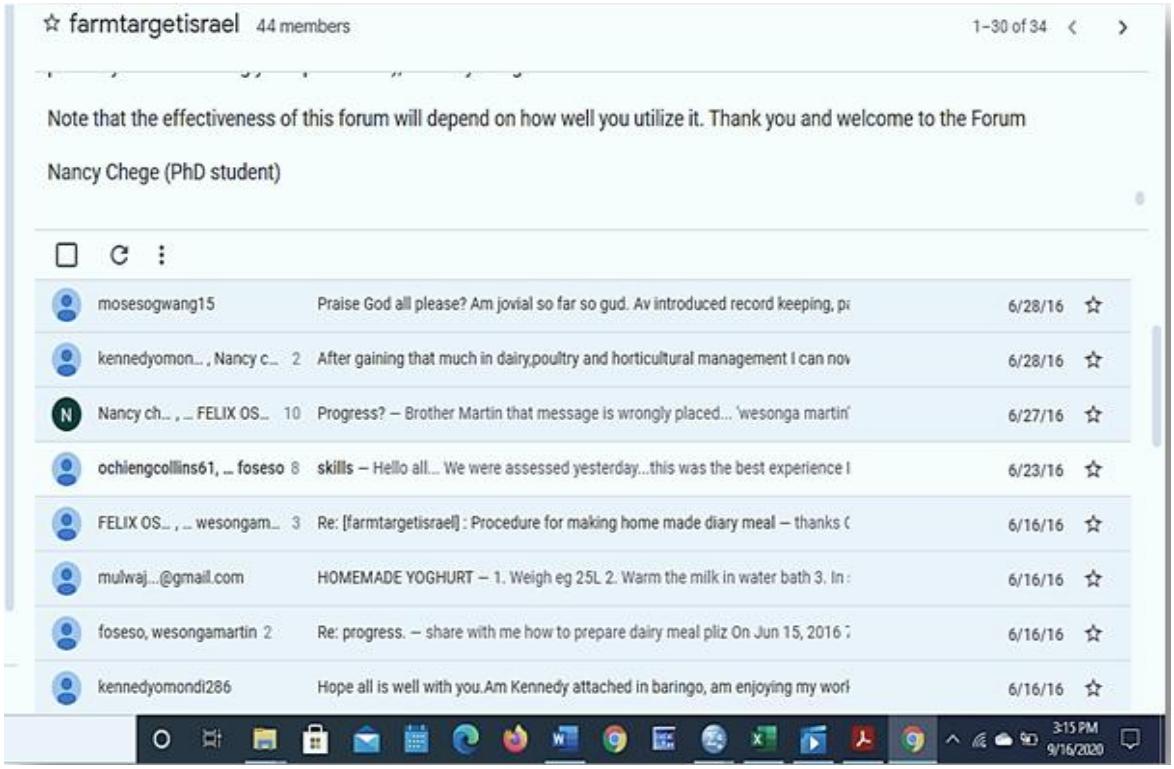

Fig. 5. Screenshot of a conversation from google online group "farm target Israel"

Further assessment of the students' attributes was explored using descriptive statistics and presented in Table 1. Based on gender, majority (73%) of the students were males. The percentage distribution of the females was 27% of the total respondents. There is need to find out why this disparity between the males and females existed in FAP. Majority (28.4%) of the students were drawn from Agribusiness management and Agricultural Economics (Agec /Agbm) department. About 9.8% students came from Agricultural Education and Extension (Aged & Ext) department. Biological Science department had a low (2.9%) representation while Department of Animal Health (AHE) was represented by very few respondents (1%). Due to the low number percentage representation, AHE department was consequently omitted in subsequent analysis. There is need to find out why FAP was not attractive to students in AHE department. In terms of the FAP's year of attachment, majority (40%) of the students were drawn from 2019. The year that had the least representation (7.8%) in the study sample was 2018.

3.1.2 Host farmers' attributes

All the farmers hosting the selected students were automatically chosen to participate in this study. Data for their attributes were provided by students hosted in their farms. The percentage distribution of the host farmers based on their ages, education levels, levels of income and the type of farming systems are shown in Table 2. The result showed that Majority (32.4%) of the host farmers were aged between 41-50years. Only 1% of the farmers were aged below 21 years. The percentage distribution of host farmers aged between 51-60 years was 28.4%. the rest of age distribution are shown in the table. In terms of the education levels, majority (46.1%) of the host farmers had University education. The rest of the percentage distribution of the farmers according to their education levels are shown in the table. Majority (50%) of host farmers engaged in large scale farming while 41.2% engaged in small scale farming system. Majority (64.7%) of the host farmers were middle income level earners while 50% of the farmers were high income level earners.

Educational level has been shown to be positively and significantly related to farm productivity. As the number of years spent in formal education increases, farmers become more productive. The implication here is that, higher literacy level influences farmers' productivity positively. This conforms to the findings of [20] which found that education was key to enhanced agricultural productivity [21] However posited that, an additional year of tertiary schooling has a negative effect on productivity. This confirms findings made by [22] which showed that as education level increases beyond a certain level, the rate of productivity declines hence there is diminishing marginal productivity with regards to education.

Table 1. Frequency distribution of students by department, year of attachment and gender

Student Attributes		Frequency	Percent
Department	Agec/ Agbm	29	28.4
	Biological Science	3	2.9
	Crops, Hort. & Soils	25	24.5
	Aged & Ext	10	9.8
	Applied Com. Dev Stud	8	7.8
	Animal Science	25	24.5
	No Response	1	1.0
	Animal Health	1	1.0
	Total	**102**	**100**
Yr. Attachment	2016	31	30.4
	2017	23	22.5
	2018	8	7.80
	2019	40	39.2
	Total	**102**	**100**
Gender	Male	75	73.5
	Female	27	26.5
	Total	**102**	**100**

Table 2. Frequency & percentage distribution of host farmers according to age, education, farming system and income

Host Farmer attributes		Frequency	Percent	Cum Percent
Age	Below 20 years	1	1	1.0
	21-30years	3	2.9	3.9
	31-40years	9	8.8	12.7
	41-50 years	33	32.4	45.1
	51-60 years	29	28.4	73.5
	61 years and above	26	25.5	99.0
	No response	1	1.0	100.0
	Total	**102**	**100**	
Education level	Primary	7	6.9	6.9
	Secondary	9	8.8	15.7
	Post-Secondary	32	31.4	47.1
	University	47	46.1	93.1
	other	7	6.9	100.0
	Total	**102**	**100**	
Farming system	Small scale Farmer	51	50.0	50.0
	Large Scale Farmer	42	41.2	91.2
	Other	9	8.8	100.0
	Total	**102**	**100**	
Income level	High Income	32	31.4	31.4
	Middle Income	66	64.7	96.1
	Low Income	4	3.9	100.0
	Total	**102**	**100**	

3.1.3 FAP structure and implementation attributes

Students were asked to rate various aspects of FAP structure and implementation in a 5-point continuum scale. The results are shown in Tables 3 and 4 respectively. The attributes of FAP structure that were considered in this study were aspects that required students to do certain things by the university e.g., writing a good quality field attachment report, requirement for farms to have already documented available jobs so that students would easily identify farms with the best experiential learning opportunities based on the type of knowledge and skills they possessed. These aspects came up during the FGDs held with the students. Requirements to have a prepared jobsheet to allow students prepare for equipment and materials to be used in the farm learning experiences well in advance was a structure that needed to be put in place. In other words, students needed a well-designed jobsheet preparation template which had to be put in place. The structure to ensure host farms had documented and analyzed jobs and tasks were rated lowest (M=2.27, SD=1.057). Some students complained they were not prepared well to write good field attachment reports and this may explain why the rating for this construct was low (M=2.74, SD=1.17).

Table 3. FAP structure levels

FAP structure construct	N	Min	Max	Mean	SD	Rating
Good Field attachment reports requirement	100	1	5	2.74	1.177	Low
Requirement for already identified farm jobs	100	1	5	2.66	1.007	Low
jobsheet preparation requirement	100	1	5	2.58	0.997	Low
Matching students and host farmers	100	1	5	2.52	1.114	Low
Having analyzed jobs requirement	100	1	5	2.27	1.033	Low
Having analyzed tasks requirement	101	1	5	2.27	1.057	Low
FAP structure index	100	1	5	2.51	0.069	Low

Overall, the FAP structure index was low (M=2.51, SD= 0.069).

Table 4. Ratings for FAP implementation indicators

Implementation Indicators	N	Min	Max	Mean	SD	Rating
making continuity arrangement	100	1	5	2.28	0.92	Low
conducting job analysis	100	1	5	2.4	0.97	Low
collection of farm data and analysis	100	1	5	2.44	0.98	Low
conducting task analysis	100	1	5	2.5	0.95	Low
Reflections on learnt experiences	100	1	5	2.58	1.05	Low
Preparing job sheets	100	1	5	2.65	1.09	Low
identification of host farm enterprises	100	1	5	3.09	1.25	Moderate
FAP Implementation Index	100	1	5	2.59	0.105	Low

Students were also asked to rate construct that would help in measuring the FAP implementation attribute. The results are shown in Table 4. In the implementation of FAP students said they needed to prepare jobsheets for instance to plan for activities in the farm. Such constructs were assessed. Others constructs included rating on conducting job analysis, task analysis among others. The rating on making continuity arrangement was given a low (M=2.28, SD=0.92). Overall, the F AP implementation index was low (m=2.59, SD=0.105).

The total ratings for both structure and implementation from all the students were then categorized into three levels": low, moderate and high levels.

3.2 Students' Level of Experiential Learning Ability

To measure the levels of experiential learning ability, indicators were adapted from [15] including: Willingness to get actively involved in the learning experiences, ability to reflect, analyze, solve problems and make decisions and finally, make arrangement for continuity of projects/innovations initiated in the host farm. various constructs were used to measure the five indicators of experiential learning abilities. These constructs and their levels are shown in Table 5. Students were asked to rate their levels of knowledge on a 5- point continuum scale. The ratings were then categorized as follows: 1-1.99= very low rating,2-1.99= moderate rating, 3-4.99 = high rating and 5= excellent rating that did not require any enhancement. The results showed that willingness to prepare job operation sheets was given a low rating (M=2.74, SD =1.05). willingness for job planning was given a moderate rating (M=3.13, SD = 1.22) and willingness to participate in the farm experiences like digging, milking etc. was given a moderate rating (M= 3.18, SD =1.18). Reflecting on learning experience by recording the experiences in a logbook was given moderate rating (M = 3.00, SD= 1.17). Reflection by writing a good field attachment report of high quality, was given a low rating (M = 2.89, SD=0.96) and reflecting by keeping farm records was given a moderate rating (M = 3.02, SD =1.19). The indicator that was rated the lowest was that of making continuity arrangement for projects and innovations initiated in the host farms by the students. Rating for written projects documents left behind by outgoing students to guide the incoming cohort of students was low (M= 2.30, SD=0.6). The rating for putting a worker to be in charge of the project was also given a low rating. (M= 2.25, SD= 0.9), the rating for making continuity arrangement generally was also low (M=2.56, SD = 0.9).

The average ratings for the experiential learning ability indicator constructs, shown in Table 6, were computed to give the experiential learning ability indices including; willingness index (Wi), Reflection index (Ri) analysis index (Ai) problem solving and decision-making index (PDi) and continuity arrangement index (Cai). The overall experiential learning ability index among students on FAP was found to be low (M=2.79, SD= 0.51). the willingness index rated highest among the five abilities with a moderate rating (M= 3.02, SD = 1.18). The ability to make continuity arrangements for initiated projects received the lowest (M= 2.37, SD=0.18) rating overall.

3.3 Effects Obtained on ELA with each FAP Design Attribute

The following variables were operationalized as the FAP design attributes in this study. (i) Students' attributes (ii) Host farmers' attributes (iii) FAP structure and implementation attributes. Following are the results of the analysis carried out in SPSS version 21.

Table 5. Constructs ratings for experiential learning ability indicators

		N	min	max	mean	SD	Rating
Willingness	i. participates in experiences	100	1	5	3.18	1.18	Moderate
	ii. planning for jobs	102	1	5	3.13	1.22	Moderate
	iii)Preparation of daily job sheets	102	1	5	2.74	1.05	low
Reflection	i. records experiences in logbook	102	1	5	3.00	1.17	Moderate
	ii. keeping farm records	100	1	5	3.02	1.19	Moderate
	ii. quality field attachment report	102	1	5	2.89	0.96	Low
	iv. Evaluating learnt experiences	101	1	5	2.84	0.97	low
Analysis	i. Carrying out Task analysis	99	1	5	2.69	0.99	Low
	ii. Designing questionnaires	102	1	5	2.53	0.96	Low
	iii. Carrying out Job Analysis	100	1	5	2.84	1.08	Low
	iv. Designing evaluations	102	1	5	2.46	0.90	Low
Problem	i. problem solving level	101	1	5	2.77	0.95	Low
Solving_	ii. decision-making level	102	1	4	2.44	0.92	Low
Decision	iii.rtg number of problems solved	102	1	4	2.01	0.92	Low
making	iv. Rating problems identified	101	1	5	2.92	1.11	Low
	v. Rating No. of decisions made	101	1	5	3.07	1.11	Moderate
Continuity	i. Rating project documents	102	1	4	2.30	0.6	Low
Arrange-	ii. worker to care for projects	102	1	5	2.25	0.9	Low
ment	iii. making continuity arr.	102	1	4	2.56	0.9	Low

Table 6. Learning Ability indices

Experiential learning ability	N	Min	Max	Mean	SD
Willingness index (Wi)	101	1	5	3.02	1.15
Reflection index (Ri)	101	1	5	2.94	0.12
Analysis Index (Ai)	101	1	5	2.63	0.98
Problem and Decision Index (PDi)	100	1	5	2.64	0.10
Continuity Arrangement Index (Cai)	102	1	4	2.37	0.18
Experiential Learning Ability Index	101	1	5	2.79	0.51

3.3.1 Effects obtained on ELA with each student's attribute

The students' attributes that were found relevant to this study included: i) Prior agricultural knowledge, ii). Gender iii) study programmes iv) study programme departments v) faculties, and vi) year of attachment. The attributes whose effects were found to be significant at 5% level of significance were four attributes namely: Prior agricultural knowledge, Gender, study programme departments and year of FAP as scheduled by the university.

3.3.1.1 Effects obtained on ELA with Students' Prior agricultural knowledge

In order to determine the effects obtained on ELAs with the student's prior agricultural knowledge, students were asked to rate their levels of knowledge. These ratings were then recoded into three categories of low, moderate and high levels. A general linear model was then run to see the effect of these levels of knowledge on students' experiential learning ability. Table 7 shows the ratings for indicators used to measure the knowledge variables. The indicators were gathered from gathered from online google groups and FGD and were also found relevant to the students' attributes. The variables included: livestock, crop, agribusiness management and agricultural engineering knowledge. The constructs used to measure these indicators, which were also picked from the google platforms and FGDs, are displayed in the table. Students were asked to rate the constructs on a 5-point continuum scale with a maximum of five (5) and a minimum of one (1). These ratings were later categorized as follows: 1-1.99=very low, 2-2.99=low, 3-3.99= moderate, 4-4.99=high and 5= excellent. Livestock knowledge area was measured using the following knowledge constructs; dairy farming, poultry farming, pig farming, fish farming, zero grazing, diagnosis of livestock diseases and on livestock nutrition. The results showed that, Knowledge in fish farming was rated lowest (M=2.43, SD=1.00). The construct that received the highest ratings

compared to others was knowledge on dairy farming (M=3.53, SD=1.16). Overall, the rating for livestock indicator variable was low (M =2.94, SE=0.89).

Research has shown that many farmers do not have adequate skills in fish farming and those who venture into it have end up with empty ponds and heavy losses. Fish farming requires that farmers undergo training and seek advice from fisheries experts on where to locate the ponds and about general fish management [23]. This may explain why fish farming got the lowest ratings among the livestock knowledge areas ratings it also appeared that majority of the students did not possess this type of agricultural knowledge and hence the low ratings.

To explore the effects of students' prior agricultural knowledge on students ELAs, the ratings obtained for prior agricultural knowledge levels were recoded into three categories of low, moderate and high levels of knowledge using Statistical Package for Social Sciences (SPSS). Boxplots shown in Fig. 6 were then drawn. The results showed that low levels of prior agricultural knowledge coincided with low levels of ELAs, moderate levels of knowledge matched with moderate levels of Experiential learning abilities and high levels of knowledge with high experiential learning abilities.

This means that the students who rated high in levels of prior agricultural knowledge were more willing to get actively involved in the farm experiences, more reflective in their learning experiences, more analytical, they were also able to solve more problems and make decisions in addition to making arrangement for the continuity of the projects/innovations they initiated in their host farms. This agrees with what was posited by [15] stating that prior knowledge was necessary in experiential learning approach for provision of internal guidance.

Table 7. Students' prior agricultural knowledge levels

Prior agricultural knowledge area		N	Mn	Mx	Mean	SD	Rating
Livestock	Fish Farming	100	1	5	2.43	1.00	Low
	Pig Farming	100	1	5	2.47	1.11	Low
	Diag. of diseases	102	1	5	2.78	1.10	Low
	Zero grazing	102	1	5	3.13	1.25	moderate
	Poultry farming	100	1	5	3.13	1.07	Moderate
	livestock Nutrition	102	1	5	3.15	1.16	Moderate
	Dairy Farming	100	1	5	3.53	1.16	Moderate
	Knowledge index	**102**	**1**		**2.94**		**Low**
Crop	Plant Breeding	100	1	5	2.48	1.10	Low
	Soils	102	1	5	2.70	1.03	Low
	Reg. pest ctrl products	102	1	5	2.74	1.05	Low
	Ident. of crop pest	102	1	5	3.19	1.12	moderate
	Crop pests	102	1	5	3.25	1.03	Moderate
	Field crops	101	1	5	3.38	1.09	Moderate
	Vegetable farming	101	1	5	3.42	1.10	Moderate
	weeds and control	102	1	5	3.52	1.18	Moderate
	Crop knowledge index	**102**	**1**		**3.08**		**moderate**
Ag	Value additions	100	1	5	3.00	1.03	Moderate
Business	Input supply	100	1	5	3.11	1.01	Moderate
	Marketing farm produce	100	1	5	3.12	0.95	Moderate
	Keeping farm records	100	1	5	3.22	0.96	Moderate
	Farm Management	100	1	5	3.39	0.96	Moderate
	Ag bus. knowledge index				**3.17**		
Agric	Tractor & Farm machine	101	1	5	1.02	0.14	Very Low
engineering	Farm Structures	100	1	5	3.24	1.10	Moderate
	Tools and Equipment	100	1	5	3.45	1.16	Moderate
	Engineer. knowledge index				**2.57**		**Low**
Overall	***Prior Agric. knowledge index***	***102***	***1***		***2.94***		***Low***

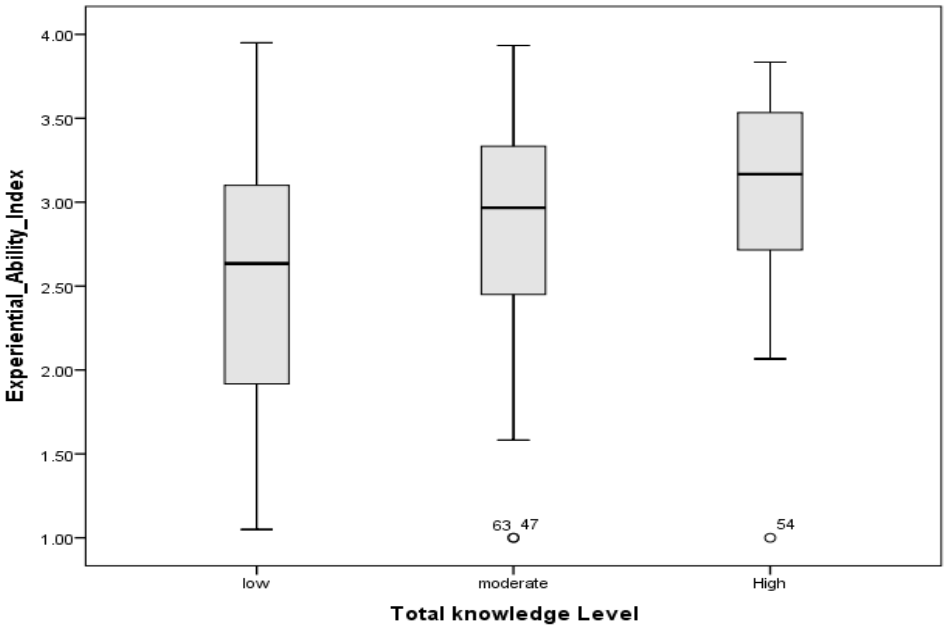

Fig. 6. Effect of prior agricultural knowledge on experiential learning ability

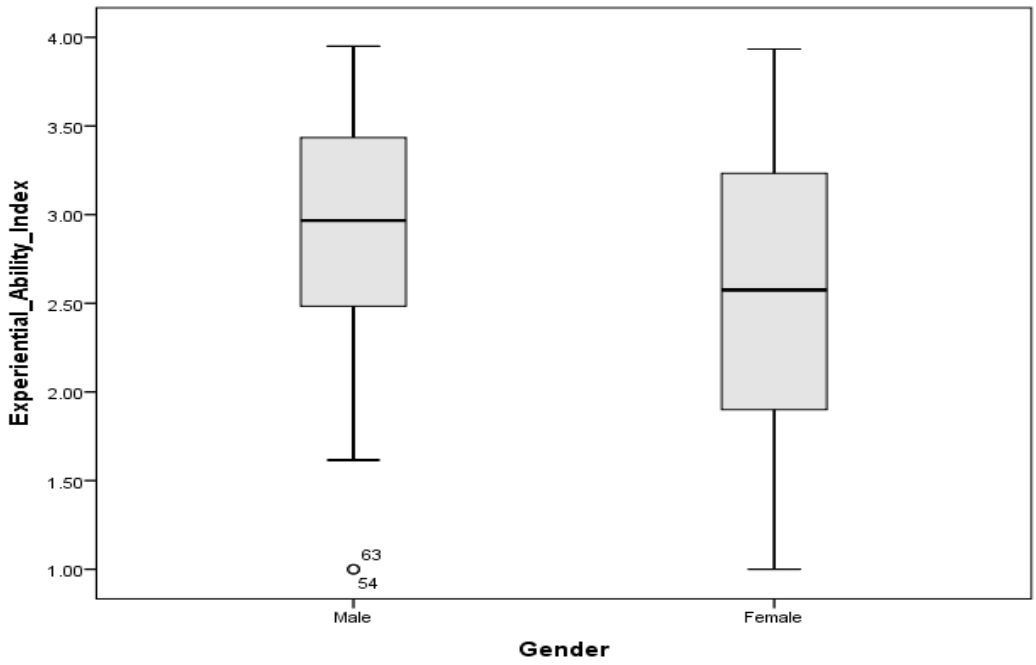

Fig. 7. Effect of gender on experiential learning ability

3.3.1.2 Effects obtained on ELAs with student's gender

The Boxplots shown in Fig. 7 were ran to explore the effect of gender on experiential learning ability. The results showed that males had higher levels of experiential learning abilities compared to females. In other words, the males were more willing to get actively involved in the learning farm practices than the females. They were also more reflective in their learning, more analytical, were better problem solvers and decision makers than the females. This agrees with [24] who posits that males and females have different learning styles. There is need to find out why the male levels were higher than the females yet they attended classes together. The variability of the scores illustrated by the length of the box

showed that distribution of the scores obtained from the male participants were more precise and therefore more reliable.

Gender is considered an important aspect in experiential learning. According [12], female participants are more; accepting, feeling, receptive graspers of experience, and collaborative. On the other hand, male participants are logical, analytical, present-oriented graspers of experience, and they are also competitive. These differences may have resulted into the significant differences in levels of experiential learning ability between the males and the females.

3.3.1.3 Effects obtained on ELAs with each students' departments

Another exploration using boxplots shown in Fig. 8 was done to determine the effects obtained on ELAs with each student's department at the university. The results revealed that students in the animal science department rated higher (when using median as the measure of central tendency) in ELAs than students in other departments. Following closely were students from department of agricultural education and extension (Aged & Ext) which also rated highest when using mean as a measure of central tendency. This may be explained by extreme rated values obtained from students in animal science department. In other words, there was a wider variability in the scores posted by students in animal science department than those in Aged & Ext. The extreme scores ratings by Animal Science students affected the mean. Students in the Biological science department had the lowest rating as shown by the boxplots. This was expected because the study programmes in this department are not agricultural courses perse and the only enterprise, they were engaged in was fish farming. As shown in the previous section, the type and level of agricultural knowledge had an effect on student's experiential learning. This may explain the low ratings in experiential learning abilities among students in biological sciences study programme department.

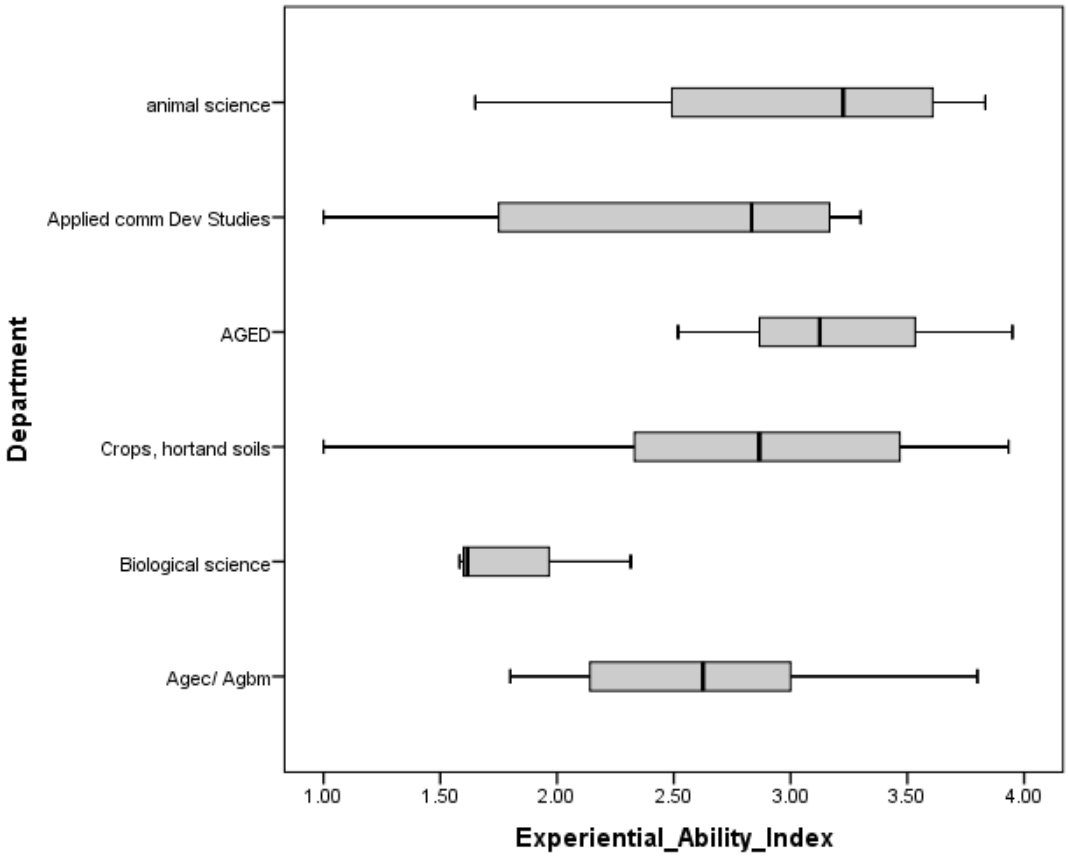

Fig. 8. Effect of academic department on experiential learning ability

3.3.1.4 Effects obtained on ELAs with each student's year of attachment

The final exploration on students' attributes was on the effect of year of attachment as scheduled by the University, on experiential learning ability. The results shown in Fig. 9 revealed that there was a positive effect between the students' year of attachment and levels of experiential learning ability. Students who attended FAP in 2018 had the highest score in experiential learning ability. Those students who attended FAP in 2019 received lowest rating. This means that the students who attended FAP in 2018 were more willing to get actively involved in farm experiences, they were more reflective and analytical. In addition, they were able to solve problems and make decisions better compared to other years. The data collected from the focus group discussions showed that those students who were out on FAP in 2019 had challenges in their host farms that may have affected their levels of ELAs. For example, a group of students narrated how they were asked to hold a sick cow in an upright position for two hours by the director of the farm that hosted them. Others complained of being used like casual labourers by their farmers. There is need to keep the initial enthusiasm in the FAP programme as the programme matures. If not checked, this may demotivate students and eventually affect their willingness to participate in the learning experiences provided in FAP. Students in other years appeared more enthusiastic in participating in the FAP programme.

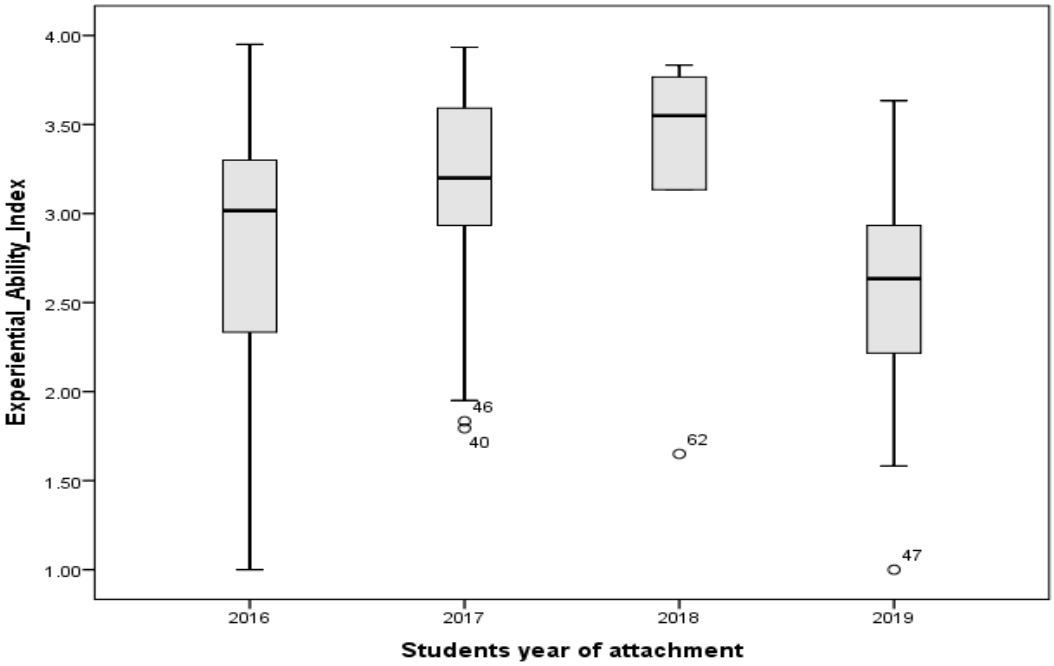

Fig. 9. The effect of year of attachment on experiential learning ability

Table 8. Effect size of Students' attributes on experiential learning ability

Tests of Between-Subjects Effects								
Dependent Variable: Z score: Experiential Ability Index								
Source	**Type III Sum of Sqs**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Sq.**	**R Sq**	**Adj Rsq**
Prior Agric Knowledge	7.63	2	3.82	4.10	0.02	0.08	0.08	0.06
Gender	4.31	1	4.31	4.47	0.03	0.04	0.04	0.03
Study Prog.	22.26	14	1.59	1.77	0.05	0.23	-	-
Study prog. department	15.91	6	2.65	2.98	0.01	0.16	0.16	0.10
Faculty	6.25	3	2.08	2.16	0.09	0.06	-	-
Attachment Yr.	11.48	3	3.82	4.21	0.00	0.12	0.11	0.09

3.3.1.5 *The size effects of students' attributes on ELAS*

Effects sizes of various students' attributes were determined by running a general linear model. Partial Eta squared (η_p^2) was used to estimate the effect sizes of various student's attributes on ELAs shown in Table 8. The results showed that four of the student's attributes had a significant effect on experiential learning ability. These attributes were: Student's level of knowledge, Gender, students' academic department and student's year of attachment. The size effect of prior agricultural knowledge on experiential learning ability was significant (F (2, 94) =4.099, p=.02). The knowledge levels contributed about 8% of the variability observed in experiential learning ability among students on FAP. The results also showed that the effect of gender on experiential learning was statistically significant (F (1,96) =4.466, p=.037). Gender accounted for 4.4% of the variability in observed in the students' experiential learning ability. A large effect size came from the academic department the students were drawn from. This variable accounted for 16.4% of the variability observed in experiential learning ability index which is categorized as a large effect size. Willingness to be actively involved in farm experiences, ability to be reflective, being analytical, solve problems and make decisions depended on the department the students were drawn from. The department could be an indicator of prior agricultural knowledge possessed by the students. Students in a department tend to have knowledge in related almost similar disciplines. FAP is usually coordinated at the departmental levels and this could explain further why this variable contributed so significantly to Experiential learning abilities of the students. Finally, the year of attachment significantly (F (3,94=4.206, p=.008) affected the experiential learning ability among students on FAP. The size effect of the year of attachment on experiential learning ability was 11.8%. This meant that the willingness to be actively involved in the farm experiences, being reflective, being analytical, possessing problem solving skills and making decisions as well as making continuity arrangements for initiated projects/innovations also depended on the students' year of attachment/cohort. Students in different cohorts sometime encounter different experiences while at the university and this may explain why the year of attachment had a significant effect on experiential learning abilities. The knowledge level, the gender, the academic department and the year of attachment had a significant effect on the experiential learning ability at 5% significance level.

3.3.2 Effects obtained on ELAs with each host farmer's attributes

Exploration was done to see the effect of Farmers' attributes on ELAs. These attributes included: I) age of the farmer, ii) education level iii) farming system and iv) social economic status. Out of the four attributes tested, only social economic status of the farmer was found to have a significant effect on students' ELAS. Boxplots shown in Fig. 10 were plotted showing the directional effect of the farmer's income levels on the ELAs. The results showed that students hosted by middle income farmers rated higher in ELAs compared to high- or low-income farmers. However, those hosted by high income farmers rated better than those in low-income households. This agrees with the discussions that came out of the FGDs where some students said they had to bring food from their own homes to support the host farmer and this affected their willingness to get actively involved in the farm experiences. Some students hosted by high income farmers reported that their host farmers were extremely busy and not available to students. They were left under the supervision of farm managers. Students said that some managers were not enthusiastic in organizing the students learning schedule and they found this to be frustrating may have affected their willingness to get actively involved in the farm experiences or reflecting on what was learnt.

3.3.2.1 *Effects sizes obtained with each host farmer's attribute*

To measure the effect significance and the effect sizes, a general linear model was used for analysis between the four attributes of the host farmers' i.e. age, level of education, the level of income and the farming system practiced, and the students' ELA levels. The host farmer's income level was found to have a significant *(F (2,45) =3.92, P=.026)* effect on the students' ELA levels. Table 9 shows the size effects of host farmers attributes on students experiential learning abilities. Farmer's income level, accounted for 13.1% of the variability in the student's experiential learning abilities. This implied that the willingness to get actively involved in the farm experiences depended to some extent on whether the student was hosted by low-income, middle income or high-income

farmers. Students hosted by the middle-income farmers appeared to have higher experiential learning ability than students hosted by either high income or low-income farmers. This may have affected students' willingness to get involved in the farm experiences and abilities to solve problems and make decisions. It also affected their ability to make continuity arrangements for initiated projects/ innovations. The age of the farmer and their education level did not have any effects on students experiential learning ability. The causes of low levels of experiential learning abilities among students were probably due to other factors other than the host farmers' attributes.

3.3.3 Effects obtained on ELAs with each FAP structure and implementation levels

Boxplots shown in Figs. 11 and 12 respectively were then drawn to see the directional effect of FAP structure on experiential learning ability. The results showed that both FAP structure and FAP implementation attributes had some effects on experiential learning ability.

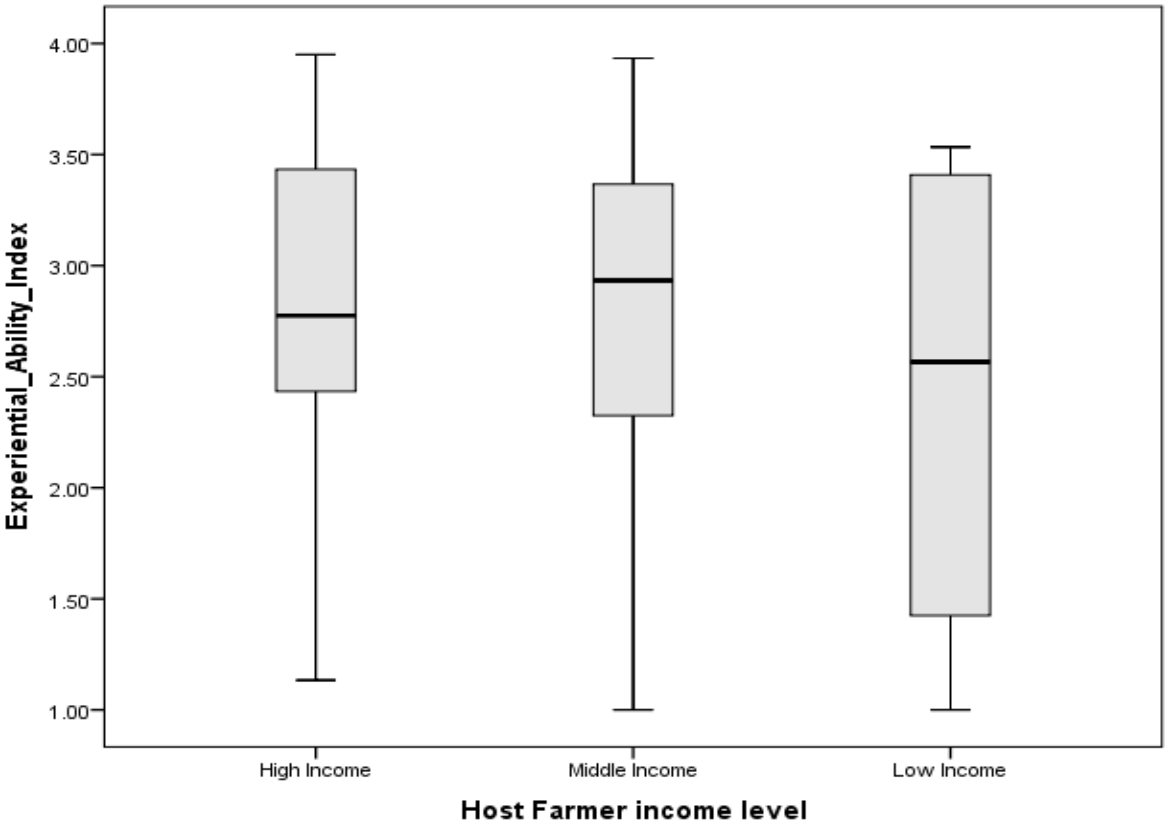

Fig. 10. Effect of income level of the host farmer on experiential learning ability

Table 9. Effect size of host farmers' attributes on experiential learning ability

Tests of Between-Subjects Effects						
Dependent Variable: Z score: Experiential Ability Index						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	53.341a	45	1.185	1.412	0.115	0.550
Intercept	8.243	1	8.243	9.818	0.003	0.159
Age	6.141	4	1.535	1.828	0.137	0.123
Farming system	1.483	2	0.741	0.883	0.420	0.033
Education level	2.231	4	0.558	0.664	0.620	0.049
Farmer's income levels	6.582	2	3.291	3.920	0.026	0.131

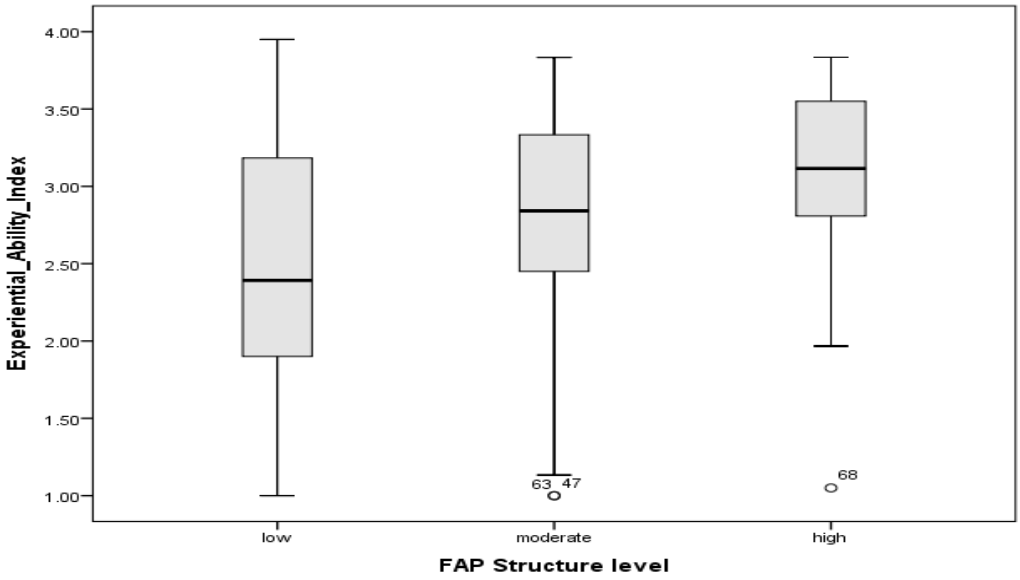

Fig. 11. Effect of FAP structure attributes on Experiential learning ability levels

Low levels of FAP structure coincided with low levels of experiential learning abilities. High level of structure matched with high levels of experiential learning abilities. This means that if FAP structure was enhanced, it would have positive effects on the experiential learning abilities among the students. On the other hand, if not properly structured then this was likely to lower the students experiential learning ability levels. Proper structuring of FAP results to more willingness of the students to get actively involved in the learning experiences, students becoming more reflective, analytical and they become better placed to solve problems and make decisions in the farm. It also meant that students are able to make continuity arrangements for projects/ innovations initiated in the host farm. Boxplots were also plotted for students experiential learning ability against the FAP implementation enablement. High levels of FAP implementation coincided with high levels of experiential learning ability. This meant that if well implemented FAP can improve levels of experiential learning ability. Fig. 12 shows the directional effects between FAP implementation and experiential learning ability.

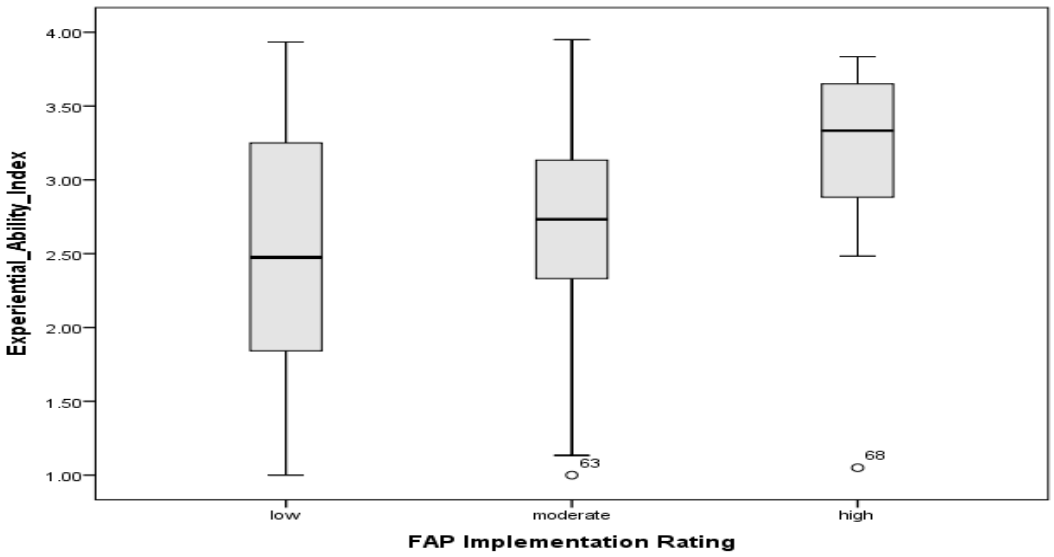

Fig. 12. Effects of FAP implementation attribute on experiential learning

Table 10. Effect size of FAP structure and implementation on experiential learning ability

Tests of Between-Subjects Effects						
Dependent Variable: Z score: Experiential Ability Index						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
FAP Structure Levels	8.142	2	4.071	4.309	0.016	0.084
FAP Implementation Level	14.478	2	7.239	8.251	0.000	0.149

The effect sizes of FAP structure and implementation on the students' experiential learning abilities were analyzed using a general linear model. and results displayed in Table 10. The outcome of the analysis revealed that FAP structure's effects was significant (F (2,94) =4.3.9, p=.016) and it accounted for η_p^2 =.084 which is equivalent to, 8.4 % of the variability observed in experiential learning ability. The FAP implementation index was also found to be highly significant (F (2,94) =8.251, p<.001) and was responsible for 14.9% of the variability in the students' experiential learning ability. This is categorized as a medium effect size.

The significance observed in the effect of FAP structure and Implementation on the students' ELAs revealed that probably an enhancement in these areas was likely to improve on students experiential learning abilities. For instance, during focus group discussions, it was clear that students minded to a large extent the way they were matched with the host farmers. They indicated that they would have learnt more if they were posted to farms with enterprises, they had knowledge about. They also complained of lack of preparation in writing good field attachment reports. Some claimed that they had not been taken through the process of report writing and this affected their ability to write good reports.

4. CONCLUSION

In conclusion, this study set out to determine the effects of Farm Attachment Programme design attributes on experiential learning ability among students of Egerton University. The levels of experiential learning ability were found to be low. The students' prior agricultural knowledge, gender, study programme departments and the year (cohort) in which the students went for the Farm attachment were found to have significant effects on the students experiential learning abilities. The host farmers' income level was found to have a significant effect on the experiential learning ability students hosted by middle income level farmers had higher levels of experiential learning abilities than those hosted by either high- or low-income earners. The FAP structure and implementation were also found to have significant effects on the experiential learning ability. To enhance students experiential learning therefore the students must be provided with prompt and reliable source of prior agricultural knowledge, it would be important to find out why the females levels of ELAs were lagging behind those of their male counterparts in order to improve their abilities. The study programme departments from which the students were drawn from were found to be significant in influencing students' willingness to be actively involved in the learning experiences, ability to reflect on learnt experiences, ability to carry out analysis on learning experiences and enabled students to solve problems and make decision. This is expected because field attachment coordination is usually done at the departmental levels. Enhancing FAP should therefore be focused at the departmental level as opposed to specific study programme or faculty levels. Some of the recommendations made were that FAP design attributes should be improved in order to maximize benefits of experiential learning through enhancement of ELAs. This in the long term is likely to have a positive effect on students' competences and acquisition of employability skills.

ETHICAL APPROVAL

All authors hereby declare that this research was licensed by the National Commission for Science, Technology and Innovation, Kenya.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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