

ATTITUDE TOWARDS UNDERGRADUATE TRAINING IN AGRICULTURE AND VETERINARY SCIENCES BY SECONDARY SCHOOL STUDENTS, TEACHERS AND PARENTS IN KENYA

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Abstract

The University of Nairobi (UoN)'s research/consultant team, in collaboration with Makerere University (MAK), Sokoine University of Agriculture (SUA) and University of Copenhagen, under a European Union-funded project entitled 'Enhancing the quality of graduates of agriculture and veterinary sciences to meet tomorrow's food security challenge (PREPARE-BSc)', conducted a baseline study on undergraduate training in agriculture and veterinary sciences in Kenya. The aim of the study was to assess the current perception and thinking of secondary school students, parents and teachers about agricultural and veterinary training at university level in Kenya. The study covered 14 schools and 315 secondary school students in which 94 were from public girls boarding, 78 from public mixed, 68 from public boys boarding and 18 from public mixed boarding. Schools were sampled from three locations, that is, urban, pre-urban and rural areas. 90% of the participating students were Form Fours with a mean age of 18 years while 51% were girls and 49% boys. The study also sampled a total of 108 teachers (61% male and 39% female) from 32 secondary schools for the survey. 31% of these teachers were in Science Department while 14% of them were from Applied Science Department. In addition, a sample of 93 parents, drawn from 15 regions, participated in the study. 55% of the parents were female while 45% of them were male. The parents had various highest academic qualifications in which 12% of them had a master's degree, 40% had a bachelor's degree and 9% had a diploma certificate. They had an average of six years as secondary school parents. The collected data, using questionnaires, interviews and observations, was analyzed using quantitative methods involving percentages and frequencies. The study found that many secondary school students study agriculture (58%) and are involved in farming (68%). Secondary school agriculture is mainly taught through practical sessions and group work. In addition, the study found that students' end of term examinations are clearly organized and feedback on their academic progression is regularly provided. The majority of secondary school students (54%) ranked agriculture as their choice of study in the university while many students expect university facilities like the laboratory, library and internet to be of high quality. Teachers' highest professional qualifications ranged from masters degree (6%), undergraduate degree level (78%), higher national diploma (2%), ordinary diploma certificate (13%) to approved teacher status by Teachers Service Commission (2%). Since graduation, teachers had averagely taught agriculture and been in their current schools for 11 and six (6) years, respectively. Agriculture is a popular subject and the majority of teachers (70%) and parents (54%) feel that agriculture, which is practically oriented and relates well to local farming systems, should be taught in all secondary schools. Many teachers feel that agriculture training in secondary school is not well facilitated (56%). Both secondary school teachers and parents view a career in agriculture as an important profession and for business purposes in the community. Teachers feel that a career in agriculture compares well with other careers and is deemed important for the community. Many people do not have positive attitudes towards agriculture and generally the community seems

not to highly value agriculture as a career. Teachers' main expectations prior to joining universities are generally met but some teachers had their expectations changed (44%). The teachers appreciate the importance of student associations and formation of links between various universities. They also find undergraduate student orientation and program bulletin important and should be encouraged. Teachers opine that university facilities, such as library and laboratories, are well equipped with adequate staff. Teachers feel that undergraduate internet services are insufficient but sharing opportunities of laboratories and library services between departments are available at institutional level. The study found that clear university course outlines are provided and modes of lecture delivery, through use of practical, group work and case studies, are effective. In the secondary school teachers' view, university lecturers are competent, committed, motivated and of high integrity. In conclusion, it can be argued that agriculture, as a subject, is a priority to many teachers, students and parents. A career in agriculture, though important to the community, is not highly regarded but universities have good and well equipped facilities for training in agriculture and veterinary sciences. The baseline survey recommends community enlightenment on the importance of agriculture as a profession. There is also need to organize forums for all stakeholders in agriculture to underscore the importance of agriculture and research in ensuring food security in the East African region.

Index Terms: Secondary School Students, Teachers and Parents' Attitude, Undergraduate Training, Agriculture and Veterinary Sciences in Kenya

I. INTRODUCTION

BSc in agriculture and veterinary science students are selected from a pool of candidates who have completed at least a four-year program in secondary school education and having passed well in pure science, agriculture and geography subjects. Selection of which courses to pursue at university level may be influenced by factors such as perceptions and expectations held by secondary school students, teachers and parents. The University of Nairobi, is one of the institutions in East Africa that, trains agricultural and veterinary scientists at degree level. To ensure food security in the region, East African universities have to prepare quality and competent market-driven graduates in agriculture and veterinary sciences. Through evidence-based research, PREPARE BSc Project aims to improve on undergraduate university programs in agriculture and veterinary sciences at the University of Nairobi. Against this background, there was need to conduct a baseline survey to establish the attitudes/expectations of secondary school students, teachers and parents towards BSc courses in agriculture and veterinary sciences in Kenya.

II. RESEARCH OBJECTIVES

The aim of the study was to assess the current perception and thinking of secondary school students, parents and teachers about agricultural and veterinary training at university level in Kenya.

III. RESEARCH QUESTIONS

The study was guided by the following research questions:

- i. How do secondary school students view agriculture as a subject and careers in agriculture/veterinary sciences in Kenya?
- ii. How do teachers view secondary school agriculture, undergraduate university courses in agriculture and careers in Agriculture?
- iii. How do secondary school parents view the teaching of agriculture and agriculture-oriented careers for their children?

IV. RESEARCH METHODOLOGY

Research design: The study employed a survey research design. A survey design was appropriate because it allowed coverage of a variety of schools in a wide area within a short period of time.

Target Population: The study targeted all (national, county, and district) public secondary schools from which the University of Nairobi draws its B.Sc. in agriculture and veterinary sciences' students. The study also targeted all public secondary school science and agriculture teachers, science students (particularly Form Fours) and parents of secondary school students studying science subjects.

Sample Size and Sampling Procedures: Schools were sampled based on the University of Nairobi's seventeen teaching practice zones. The 9 sampled zones include: Nairobi, Nakuru/Samburu, Narok/Kericho/Bomet, Kisii, Kisumu/Busia, Kakamega/Bungoma, Kitale/Eldoret, Kiambu/Thika/Muranga, and Machakos/Voi. Using the list of schools and based on the school category (national, public or district), six (2 boys, 2 girls, and 2 mixed) schools were randomly sampled in each zone. The study also ensured that each zone had at least one national, one county and one district school randomly sampled, where all the three types of schools were available.

Research Instruments: Research instruments were developed in line with project objectives and included questionnaires for students, parents and teachers.

Validity: For validity the research team developed the research tools based on the project objectives and subjected research them to expert judgment by colleagues from the four participating universities: The University of Nairobi, Sokoine University of Agriculture and Technology, Makerere University and University of Copenhagen.

Reliability: The instruments were pre-tested with a selected sample similar to the actual sample that was used in the actual study. The expectation was that procedures used in pretesting the instruments would be similar to those that would be used during the actual study. Piloting targeted about 1% of the entire sample size. The sample that was used during the piloting was not included in the main study. Research tool items were retained, modified, deleted or added based on the pilot results.

Data Collection Procedures: Data were collected using questionnaires. Prior to embarking on the research, the research proposal was discussed by participating universities and data collection timeframe set. Research tools were developed and pre-tested with a sample that was not be included in the main study to determine reliability and validity. With assistance of zone coordinators, schools were sampled and visited for data collection. Data collectors waited in each site until the questionnaires were filled upon which they collected them. Where this was not possible, arrangements were made to collect the questionnaires as soon as possible. In both cases data, collectors ensured data collected were credible, trustworthy and reliable.

Data Analysis Procedures: Quantitative analyses of data were conducted following data cleaning and screening. Specifically data collected were analyzed using SPSS and other appropriate statistical software and reported in percentages, frequencies, means and standard deviations.

Ethical Issues of the Research Study: The research team made ethical considerations by explaining the purpose of the study to participants and assuring them of confidentiality, privacy and anonymity of their responses throughout the research process. The research team consciously avoided causing physical or psychological harm to respondents through embarrassing and/or irrelevant questions, threatening language or making respondents nervous. Participants were informed of their right of refusal to participate in the research without providing explanation but explained to them that it would be mutually beneficial to participate in the study.

V. DATA ANALYSIS, FINDINGS AND DISCUSSIONS

Introduction

In this section, preliminary results for the analyzed data are presented according to the research questions generated for the survey.

Findings on Research Question One: How do secondary school students view agriculture as a subject and careers in agriculture/veterinary sciences in Kenya?

Through stratified random sampling of schools, data was collected from various categories of secondary schools as shown in Table 1.

Table 1: Number of Selected Students based on Secondary Schools' Categories

School Category	Number of Students	Percentage %
Public girls boarding	94	36.43
Public mixed day	78	30.23
Public boys boarding	68	26.36
Public mixed boarding	18	6.98
Total	258	100

Table 1 shows that 36.43% of the student respondents came from girls' boarding secondary schools, 30.23 % from mixed day secondary schools, 26.36 % from public boys' boarding secondary schools and 6.98% from mixed boarding secondary schools. The results appear to show that majority of the respondents studied under single sex type of secondary schools (62.79%) while the rest of the respondents studied

under mixed sex environments (37.21%). Public girl's boarding schools had the highest number of participants while public mixed boarding had the least number of participants. The schools were from different locations in Kenya. Figure 1 shows the various locations where the survey schools are found.

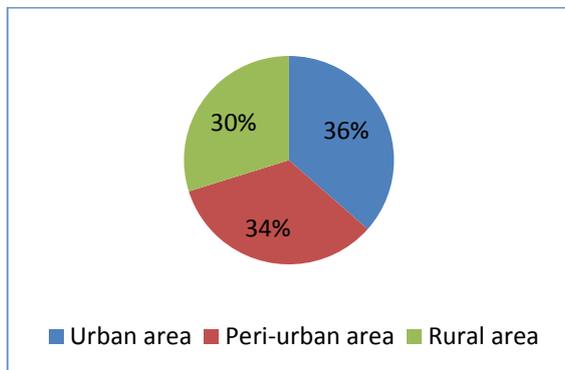


Figure1. A pie chart showing the location of selected secondary schools

From Figure 1, it can be seen that 36% of the selected schools are from urban areas, 34% from peri-urban, and 30% from rural areas. The results suggest that the selected schools' locations are evenly distributed among the three areas. On the other hand, the students' gender was analyzed and the results are shown in Figure 2.

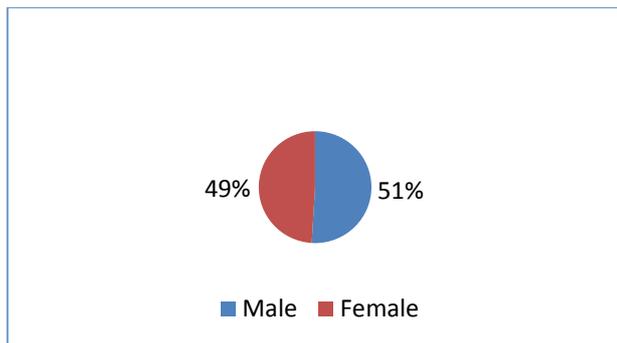


Figure2: Secondary students' gender

Figure 2 shows that 51% of the students who participated in the survey are males while 49% are females. These high school students attended classes at different levels (Form One, Two, Three and Four) as shown in Figure 3.

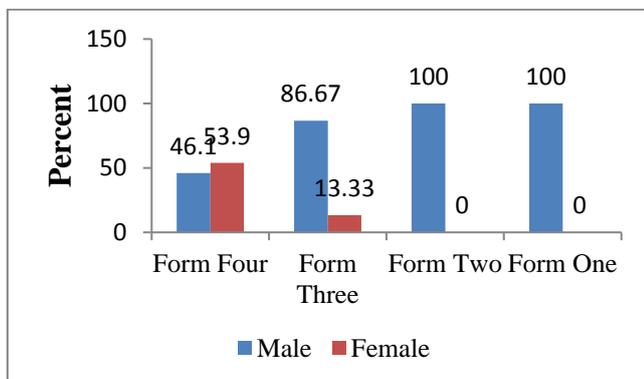


Figure3. Students class Level according to gender

Figure3 indicates that 53.9% of volunteered Form Four students were male while 46.1 % of them were female. For

the Form Threes, 86.67% of them were male and 13.33% female. The volunteered Form Two and One student participants were all male. This result appears to suggest that the Form Four students' gender is almost evenly distributed.

The mean age of the students who participated in the survey is shown in Table 2.

Table 2: Mean age of Volunteered Students in the Survey

Gender	Mean age in years	Standard Deviation	N
Male	17.97	1.70	159
Female	17.71	1.19	154
Average	17.86	1.49	313

From Table 2, it is evident that the overall mean age for the students participating was 17.86 years (N= 313, SD = 1.49). The students classified secondary school subjects they study based on gender as shown in Figure3.

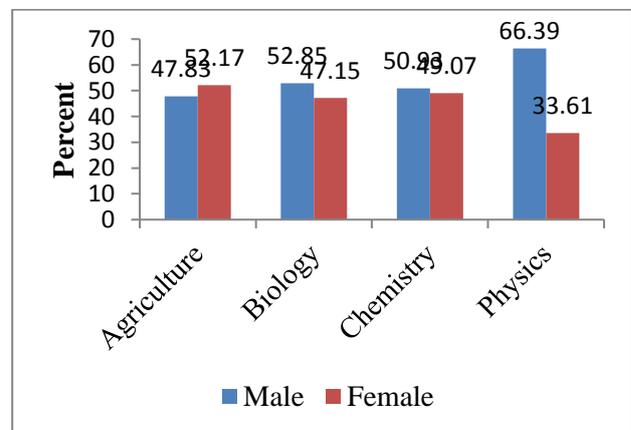


Figure 4. Classification of subject of study by students based on gender

It can be seen from Figure 4 that 52.17% of the students taking agriculture is Female while 47.83 of them are male. 52.85% of the students studying biology are male while 47.15% are female but chemistry is studied by 50.93% and 49.07% male and female students, respectively. Physics is studied by 66.39% male and 33.61 female students. The results appear to indicate that more female student (52.17%) study secondary school agriculture as compared to male students (47.83%).

The study sought to establish whether students undertaking secondary school agriculture also participated in farming. Result for the analyzed data is shown in Table 3.

Table 3: Students involved in Farming and Studying Secondary School Agriculture

Subject	Percentage %	Involved in farming %
Studying agriculture	58.54	69
Not studying agriculture	41.46	31
Total	100	100

From Table 3, it can be seen that 58.54% of student study agriculture and 69% of the students who did agriculture were involved in farming while 69 % of those students not taking agriculture were not involved in any type of farming. The students were asked to provide their opinion in regard to statement written about teaching of science/agriculture subjects. The analyzed information is shown in Table 4.

Table 4: Students Opinion about Delivery of the Science/Agriculture Subjects

Statement	At least disagreed (%)	At least agreed (%)
Teaching procedures are clearly stated	17	83
Teaching is delivered effectively	17.94	82.06
Teaching is delivered through practical sessions	26.06	73.94
Teaching is delivered through group work	27.92	72.08
Teaching is delivered through individualized studies	59.54	40.46
Clear course assessment are done throughout the term	32.47	67.53
Teachers provide frequent feedback on academic progression	29.47	74.1
Clearly organized examinations are given	12.09	87.91

From Table 4, it is evident that the majority of students feel that the teaching of sciences/agriculture in secondary schools involves clearly stated procedures (83%), effective teaching (73.94%), practical sessions (73.94%), group work (72.08%), clear course assessment throughout the school term (67.53%), frequent feedback on students' academic progression (74.1%), and well organized school examinations (87.91%). However, many students feel that teaching of secondary school science/agriculture subjects is not done based on individualized studies (59.54%).

The study further sought to establish the secondary school students' opinion about their science/agriculture teachers' characteristics. Table 5 shows the results for the analyzed data.

Table 5: Students' Opinion about their Science/Agriculture Teacher's Characteristics

Teacher's Characteristics	At least disagreed (%)	At least agreed (%)
Teachers are committed in teachings	18.24	81.76
The teachers are knowledgeable and competent	14.75	85.25
Teachers are responsive to student course needs	20.91	79.09
Teachers are easily accessible to students	25.08	74.92
Teachers are adequately facilitated	30.62	69.39
Teachers have a high degree of integrity	22.3	77.7
Teachers are highly motivated	27.06	72.93

Results presented in Table 5 indicate that the majority of the students concurred that their teachers are committed to teaching (81.76%), knowledgeable and competent (85.25%), responsive to student course needs (79.09%), easily accessible to students (74.92%), adequately facilitated (69.39%), highly motivated (72.93%), and of high integrity (77.7%). These results suggest that the majority of secondary school teachers of science/agriculture are people of good character in their teaching profession.

Students provided information about the type of agriculture projects they conducted in school. The results of the analyzed student responses in presented in Table 6.

Table 6: Students' Participation in various Types of School Agriculture Projects

Agriculture projects in your school	Frequenc y	Percent %
School gardens with students plants	252	95.82
Mixed school farm with crops and animals	177	67.3
A farm with crops only without animals	84	31.94
Aquaculture	73	27.76
School land and animals but student are not involved	59	22.43
Poultry	39	14.83
Woodlots	38	14.45
Apiculture	36	13.69
Nothing	13	4.94

Table 6 shows that secondary school students are involved in a variety of agriculture projects such as school gardens (95.82%), mixed school farm (67.3%), school farm with crops (31.94%), aquaculture (27.76%), poultry (14.83%), woodlots (14.45%), and apiculture (13.69%). It is evident that the school garden with student plants is the most done agriculture project with apiculture being the least done project.

Secondary school students' view about university teaching/learning facilities was sought. Results for the analyzed responses are presented in Table 7.

Table 7: Students Opinion about University Teaching/learning Facilities

Opinion about teaching/learning facilities	At least disagreed %	At least agreed %
Internet is adequate for undergraduates	32.77	67.23
Library facilities are adequate	24.83	75.17
Laboratories are well equipped	26.11	73.89
Laboratory are well staffed	33.56	66.44
Sharing of laboratories between departments	38.46	61.54
Sharing of laboratories between Institutions	46.34	53.65
Sharing of libraries between departments	34.04	65.97
Sharing of libraries between institutions	44.56	55.44
Adequate program facilities	32.27	67.73

Results in Table 7 suggest that the majority of students have a positive view about university teaching/learning facilities and are likely to meet their university expectations. The students assume that internet for undergraduates is adequate (67.23%), library facilities are sufficient (75.17%), shared between departments (65.97%) and institutions (55.44%), laboratories are well equipped (73.89%), staffed (66.44%), shared between departments (61.54%) and institutions (53.65%), and provision of university program facilities is adequate (67.73%).

Students were asked to rank the courses/subjects they would like to pursue at university. Results for students' choices based on preferences are presented in Table 8.

Table 8: Students' Ranking of Subjects Based on Preferences

Ranking	1	2	3	4	5	6	7	8	9	10	11	12
Agriculture	54	32	15	11	16	14	12	16	5	15	28	31
Biology	53	35	28	16	22	20	15	10	6	6	23	23
Chemistry	12	35	32	37	21	27	17	18	12	20	8	12
Engineering	33	33	21	26	26	19	14	15	16	17	15	10
Food science	8	7	18	16	23	29	28	28	35	17	22	14
Geography	13	12	13	17	19	22	23	24	16	41	25	14
Medicine	27	11	19	24	21	12	38	28	23	17	14	11
Mathematics	16	29	25	28	21	31	23	23	25	13	8	8
Physics	9	18	24	19	13	13	14	14	28	29	33	30
Computer Science	18	17	21	20	24	23	21	30	31	15	14	9
Humanities	9	16	16	16	19	21	17	25	23	35	27	15
Economics	11	18	25	19	27	15	21	12	26	16	19	33

From Table 8, is evident that a course in agriculture was ranked number one by many students followed by biology while food science had the least number of students having it as their first choice.

Findings on Research Question Two: How do teachers view secondary school agriculture, undergraduate university courses in agriculture and careers in Agriculture?

Data was collected from 108 (61% male and 39% female) secondary school teachers from various sampled schools. Table 9 shows the teachers' departments.

Table 9: Secondary School Teachers' Departments

Department	Frequency	Percentage (%)
Science	31	36.47
Applied Science	14	16.47
Mathematics	10	11.76
Biology	7	8.24
Agriculture	6	7.06
Physics	5	5.88
Chemistry	5	5.88
Humanities	4	4.71
Technical	3	3.53
Total	85	100

From Table 9, it can be seen that sampled teachers came from the Department of Science (36.47%), Applied Science (16.47%), Mathematics (11.76%), Biology (8.24%), Agriculture (7.06%), Physics (5.88%), Chemistry (5.88%), Technical (3.53), and Humanities (4.71). The results indicate that the majority of the teachers are from science-oriented departments (95.29%) and likely to be knowledgeable/competent to comment about university courses in agriculture and veterinary sciences. The teachers' academic qualifications are shown in Figure 5.

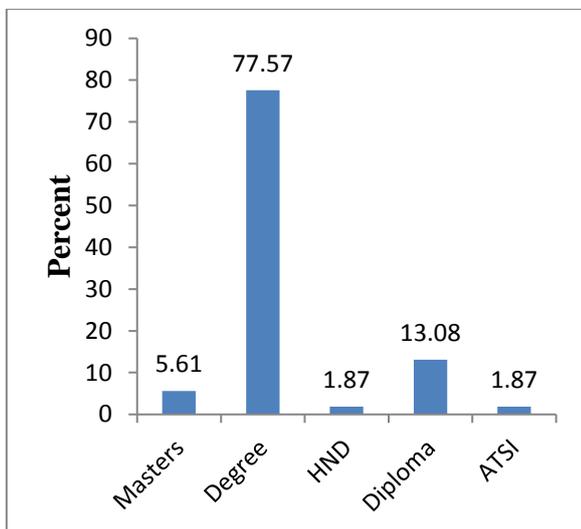


Figure 5. Secondary school teachers' academic qualifications

Figure 5 shows that 77.57% of the teachers interviewed have a bachelor's degree, 5.61% of them have a master degree, 1.87% have higher national diploma, 13.08% had an ordinary diploma, and 1.87% had approved teacher status (ATS) qualifications. The results suggest that all the teachers have academic qualifications that placed them in a position to comment about teaching of secondary science and agriculture subjects.

The surveyed teachers provided information about the institutions of higher learning they had trained as teachers as shown in Table 10.

Table 10: Institution of Higher Learning attended by Secondary School Science Teachers

Institution	Institution Type	Frequency	Percentage %
Kenyatta University	Public	23	29.49
Egerton University	Public	19	24.36
University of Nairobi	Public	13	16.67

Moi University	Public	4	5.13
Masinde Muliro University of Science and Technology (MMUST)	Public	4	5.13
Kenya Science Teachers College (KSTC)	Public	4	5.13
Maseno University	Public	3	3.85
Jomo Kenyatta University of Agriculture and Technology (JKUAT)	Public	2	2.56
University of Eldoret	Public	1	1.28
Catholic University of Eastern Africa (CUEA)	Private	1	1.28
Makerere University	Public	1	1.28
Kisii University	Public	1	1.28
Mount Kenya University (MKU)	Private	1	1.28
Africa Nazarene University	Private	1	1.28
Total		78	100

From Table 10, it is evident that the majority of teachers had studied in public institutions (96.16%) with Kenyatta University producing the highest number of teachers (29.49%), followed by Egerton University (24.36%) and University of Nairobi (16.67%).

In addition, the teachers' average number of years of teaching agriculture in their current schools was 6.1 years with a standard deviation of 6.12. Since graduation from institutions of higher learning, the teachers had also taught agriculture for an average of 11.13 years with a standard deviation of 8.9.

Information about teachers' view on popularity of undergraduate university courses was surveyed. Teachers indicated whether a given undergraduate university course was popular or unpopular. Popularity ranking of undergraduate university courses by teachers is presented in Table 11.

Table 11: Secondary School Teachers' Ranking of Undergraduate University Courses

Courses	Popularity %	Least Popular %	Total	N
Biology	84.85	15.15	100	99
Agriculture	69.79	30.21	100	96
Computer Studies	68.97	31.03	100	87
Chemistry	64.58	35.42	100	96
Mathematics	61.86	38.14	100	97
Economics	47.44	52.56	100	78
Physics	47.19	52.81	100	89
Geography	41.11	58.89	100	90
Entrepreneurship	38.57	61.43	100	70
Health Science	34.25	65.75	100	73
Food and Nutrition	29.41	70.59	100	68
Technical Drawing	29.11	70.89	100	79

Table 11 shows teachers ranked biology as the most popular subject (84.85), followed by Agriculture (69.79%), computer studies (68.97%), chemistry (64.58%), and mathematics (61.86%). The least popular course was technical drawing (29.11%) followed by food nutrition (29.41). The teachers also gave their views about secondary school agriculture (see Table 12).

Table 12: Teachers’ Views about Secondary School Agriculture

Statement	Disagree %	Agree %	Total	N
Agriculture should be taught in all schools	15.78	84.22	100	11
Agriculture is practically oriented	25.66	74.34	100	11
Adequate provision of teaching resources	57.52	42.48	100	11
Agriculture relate well to local farming systems	23.01	76.99	100	11
Agriculture is Essential for admission to University	21.93	78.07	100	11
Some of my candidates join university to study agriculture	20.18	79.82	100	11
Agriculture career compare well with others	23.69	76.31	100	11
Career opportunity exist in Agriculture	20.54	79.46	100	11
Young people should be encouraged to study agriculture	9.65	90.35	100	11
Agriculture profession is important to the society	12.28	87.72	100	11
Positive feeling towards career in Agriculture	45.13	54.87	100	11
Positive feeling towards training curricula in Agriculture	36.7	63.3	100	10

From Table 12, it can be seen that majority of teachers think that agriculture is important to be taught in schools (84.22%), practical-oriented (74.34%), relevant to local farming systems (76.99%), and essential for university admission (78.07%). It is also evident that many teachers had their own candidates joining university to pursue agriculture (79.82%), think that opportunities exist in agriculture (79.46%), careers in agriculture compare well with other careers (76.31%), and young people should be encouraged to pursue careers in agriculture (90.35%). In addition, teachers think that agriculture profession is important in society (87.72%) and 63.3% of the teachers have positive feelings towards training curricula in agriculture while 54.87% of them have positive attitude towards careers in agriculture.

The survey sought to find out whether secondary school teachers had chosen to pursue a career in agriculture prior to joining university education. The teachers’ choice of undergraduate studies is shown in Figure 6. Figure 6 shows that 32.38% of the teachers had chosen agriculture as their first choice of undergraduate university course, 38.1% had agriculture as their second choice while 19.05% and 10.48% of the teachers choice agriculture as their third and fourth choice, respectively.

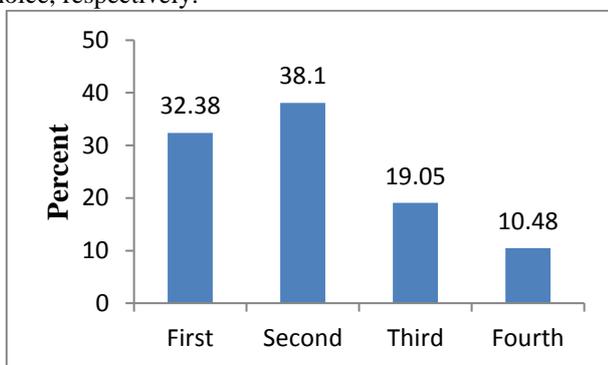


Figure 6. Secondary school teachers’ choice of agriculture as their university course

These results suggest that the majority of secondary school science and agriculture teachers have a positive view about agriculture both in secondary and in institutions of higher learning.

Information about teachers’ expectations on undergraduate university courses was collected and the results for the analyzed data are presented in Table 13.

Table 13: Secondary School Teachers’ Undergraduate University Course Expectations

Teachers expectation	Yes %	No %	Total	N
Main university expectation fulfilled	53.1	46.8	100	11
Main university expectation valid	75.2	24.7	100	11
University teaching quality expectation met	69.3	30.7	100	4
University teaching facilities quality expectation met	66.3	33.6	100	11
University social life quality expectation met	71.6	28.3	100	11
University expectations changed	55.7	44.2	100	11
	5	5	100	3

From Table 13, it is evident that teachers’ main university expectation was fulfilled (53.15%), and valid (75.22%). It can also be seen that teachers’ expectations were met in relation to teaching quality met (69.3%), teaching facilities’ quality (66.36%), and quality of social life (71.68%). However, it is worth noting that majority of teachers have had their university expectations changed (55.75%).

On the other hand, teachers’ opinion on university students’ associations are shown in Table 14.

Table 14: Secondary School Teachers’ Opinion about University Student Associations

Statement	Disagree %	Agreed %	Total	N
The university had orientation program	8.85	91.15	100	11
Universities should have orientation program	7.08	92.92	100	3
University had student association	5.3	94.7	100	11
Student association had links with other associations	26.55	73.45	100	3
Student association should form links with other associations	10.71	89.29	100	11
Student associations are necessary	10.61	89.39	100	11
The university had a student program bulletin	35.46	64.54	100	11
			100	0

Table 14 indicates that majority of teachers had university orientation programs (91.15%), which should be encouraged in universities (92.92%). The teachers also had university student associations (94.7%), which were necessary (89.39%), had links with other associations (73.45%) and should form more links with other university associations (89.29%). It can also be noted that majority of teachers had a student program bulletin during their university training (64.54%).

Data was collected on teachers’ opinion about university laboratory and library facilities and the analyzed results are shown in Table 15.

It can be noted from Table 15 that majority of teachers feel that they had adequate library facilities (63.4%), equipped laboratories (69.65%) and staffed laboratories (66.07%). It is also evident that 64.72% and 62.17% of teachers feel that laboratories and libraries are shared between departments,

respectively, and provision of dedicated undergraduate programs (66.36%). However, majority of teachers feel that university internet provision was inadequate (52.68%), and there is limited sharing of library (52.72%) and laboratory facilities (61.68%) between institutions.

Table15: Secondary School Teachers’ Opinion about University Laboratories/ Libraries

Statement about university facilities	At Least Disagreed %	At Least Agreed %	Total	N
Internet provision was adequate	52.68	47.32	100	11
Library facilities was adequate	36.6	63.4	100	11
Laboratories were adequately equipped	30.35	69.65	100	11
Laboratories were adequately staffed	33.93	66.07	100	11
Laboratory share between departments	35.28	64.72	100	11
Laboratory share between Institutions	61.68	38.32	100	11
Library share between departments	37.83	62.17	100	11
Library share between Institutions	52.72	47.28	100	11
Dedicated undergraduate programs	33.64	66.36	100	11

In terms of modes of university teaching, teachers were given opinion statements to respond to. Results for the analyzed data are presented in Table 16.

Table 16: Secondary School Teachers’ Opinion about Mode of University Teaching

Statement on mode of teaching	At Least Disagreed %	At Least Agreed %	Total	N
Procedure clearly stated	16.66	83.34	100	90
delivered through effective lectures	26.85	73.15	100	10
delivered through practical sessions	33.33	66.67	100	10
delivered through group work	37.04	62.96	100	10
delivered through individualized studies	55.14	44.86	100	10
delivered through open and distance mode	60.95	39.05	100	10
delivered through use of case studies	43.4	56.6	100	10
clear course assessment done	20.76	79.24	100	10

It can be noted from Table 16 that university teaching involved clearly stated procedures (83.34%), effective lectures (73.15%), practical sessions (66.67%), group work (62.96%), limited individualized studies (55.14%), limited open and distance modes (60.95%), use of case studies (56.6%), and clear course assessments (79.24%).

The study survey sought to establish the teachers’ opinion about university lecturers. Table 17 shows a summary of the analyzed data from the teachers’ views on university lecturers.

Table 17: Secondary School Teachers’ Opinion about University Lecturers

Opinion on the lecturers	At Least Disagreed %	At Least Agreed %	Total	N
feedback on academic progression	34.9	65.1	100	10
clearly organized examinations given	13.21	86.79	100	10
committed to undergraduate work	14.15	85.85	100	10
knowledgeable and competent	23.58	76.42	100	10
responsive to the students need	34.91	65.09	100	10
easily accessible to students	40	60	100	10
adequately facilitated	31.43	68.57	100	10
had high degree of integrity	33.65	66.35	100	10
highly motivated	39.42	60.58	100	10

The results presented in Table 17 indicate that majority of teachers are of the opinion that university lecturers are committed to their undergraduate work (85.85%), knowledgeable and competent (76.42%), responsive to students’ needs (65.09%), easily accessible (60%), adequately facilitated (68.57%), highly motivated (60.58%), and have a high degree of integrity. The results suggest that majority of university lecturers are professionals capable of handling their teaching and training of students knowledgeably and competently in their areas of specialization.

Findings on Research Question Three: How do secondary school parents view the teaching of agriculture and agriculture-oriented careers for their children?

Data was collected from 95 parents, with children in secondary schools, in various regions within Kenya. Figure 7 shows the parent gender.

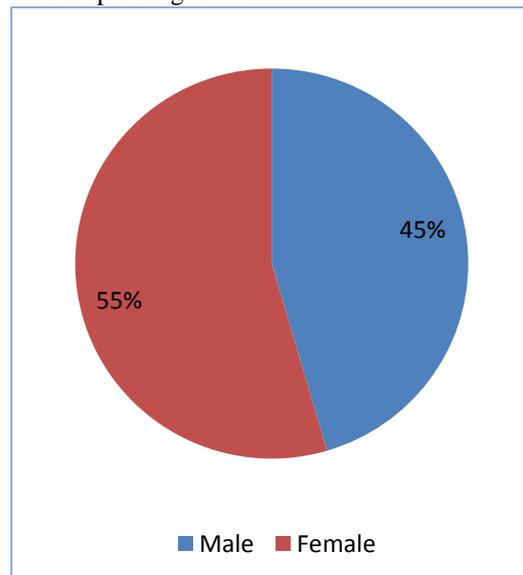


Figure 7. Gender of secondary school parents
Figure 7 shows that the parents who volunteered to participate in the survey were 55% Female and 45% Male. The parents’ highest academic qualifications are presented in Figure 8.

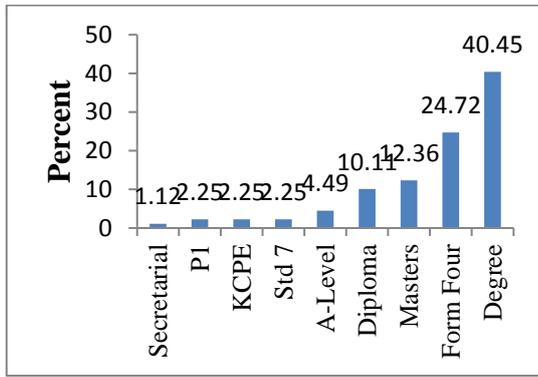


Figure 8. Secondary school parents' highest academic qualification

It can be noted from Figure 8 that all parents had been to school with 40.45% of them having bachelor's degrees, and 12.36% of them having master's degrees giving a total of 52.81% of the parents with at least a degree qualification. These parents had children in secondary schools for an average of 6.34 years with a standard deviation of 4.81.

The parents were asked to indicate which courses they felt were popular and not popular at university or college level. The results of the parents' responses are shown in Table 19

Table 19: Parents' Views on Popularity of Courses in the University/ College

Courses	Popular %	Least Popular %	Total %	N
Biology	68.35	31.65	100	79
Computer Studies	67.07	32.93	100	82
Health Science	66.67	33.33	100	81
Chemistry	65	35	100	80
Engineering	63.1	36.9	100	84
Mathematics	57.32	42.68	100	82
Economics	53.75	46.25	100	80
Agriculture	53.57	46.43	100	84
Geography	41.77	58.23	100	79
Veterinary Science	40	60	100	80
Food and Nutrition	37.8	62.2	100	82
Physics	35.44	64.56	100	79

Table 19 shows that parents' popular courses they are likely to recommend for their children are biology (68.35%), computer studies (67.07%), health science (66.67%), chemistry (65%) engineering (63.1%), mathematics (57.32%), economics (53.75%), and agriculture (53.57%). However, parents' unpopular courses for their children include Geography (58.33%), veterinary science (60%), and food nutrition (62.2%)

The study sought to establish the attitude of parents towards secondary school agriculture. The results of their responses are presented in Table 20. From Table 20, it is evident that parents highly value secondary school agriculture. Majority of parents are of the view that agriculture profession is important to society (93.67%), and young people should be encouraged to pursue studies in agriculture (88.42%). They are of the view that agriculture should be taught in all schools (88.04%) and candidates should be encouraged to pursue further studies in agriculture (81.06%). The parents also feel that agriculture is essential

for admission to university (75.79%), careers exist in agriculture (71.58%) which is practical-oriented (71.53%), and students perform well in national agriculture examinations (70.52%).

Table 20: Parents Opinion about Secondary School Agriculture

Statement	At Least Disagreed %	At Least Agreed %	Total	N
Agriculture should be taught in all schools	11.96	88.04	100	9
Agriculture is practically oriented	28.47	71.53	100	9
Adequate provision of teaching resources	48.94	51.06	100	4
Agriculture relate well to local farming systems	40	60	100	9
Student perform well in Agriculture at KCSE level	29.48	70.52	100	5
Agriculture is Essential for admission to University	24.21	75.79	100	9
Candidate are encouraged to study agriculture	18.94	81.06	100	5
Agriculture career compare well with others	35.79	64.21	100	9
Career opportunity exist in Agriculture	28.42	71.58	100	5
Young people should be encouraged to study agriculture	11.58	88.42	100	5
Agriculture profession is important to the society	6.33	93.67	100	5
Community members value career in Agriculture	46.31	53.69	100	5
Community members value business in Agriculture	43.15	56.85	100	5
Agriculture training meets the need of the community	43.01	56.99	100	3

From Table 20, it is evident that parents highly value secondary school agriculture. Majority of parents are of the view that agriculture profession is important to society (93.67%), and young people should be encouraged to pursue studies in agriculture (88.42%). They are of the view that agriculture should be taught in all schools (88.04%) and candidates should be encouraged to pursue further studies in agriculture (81.06%). The parents also feel that agriculture is essential for admission to university (75.79%), careers exist in agriculture (71.58%) which is practical-oriented (71.53%), and students perform well in national agriculture examinations (70.52%). They feel that careers in agriculture compare well with other professions (64.21%) as school agriculture relates well to local farming systems (60%). However, only 56.99% of parents are satisfied that agriculture training meets community's needs while 56.85% of them value business in agriculture. The results also show that 53.69% of parents think that community members value careers in agriculture while 51.06% of them feel that agriculture teaching resources are adequate in secondary schools. Based on these results, it is evident that secondary school parents have a positive attitude towards secondary school agriculture and careers in agriculture.

VI. SUMMARY AND DISCUSSION

The study found that 58.54% of students study agriculture out of which 68% are involved in farming at home. Students

rank a course in agriculture as number one followed by biology. They are involved in a variety of agriculture projects such as school gardens (95.82%), mixed school farm (67.3%), school farm with crops (31.94%), aquaculture (27.76%), poultry (14.83%), woodlots (14.45%), and apiculture (13.69%). The study also found that students feel that the teaching of sciences/agriculture in secondary schools involves clearly stated procedures (83%), effective teaching (73.94%), practical sessions (73.94%), group work (72.08%), clear course assessment throughout the school term (67.53%), frequent feedback on students' academic progression (74.1%), and well organized school examinations (87.91%). However, students feel that teaching of secondary school science/agriculture subjects is not done based on individualized studies (59.54%). Students also concurred that their teachers are committed to teaching (81.76%), knowledgeable and competent (85.25%), responsive to student course needs (79.09%), easily accessible to students (74.92%), adequately facilitated (69.39%), highly motivated (72.93%), and of high integrity (77.7%). These results suggest that school teachers of science/agriculture are effective in their teaching profession.

In terms of career development, 54 % of students rank agriculture as their first choice of study in the university. Students appeared to have a positive view about university teaching/learning facilities and are likely to meet their university expectations. The students assume that internet for undergraduates is adequate (67.23%), library facilities are sufficient (75.17%), shared between departments (65.97%) and institutions (55.44%), laboratories are well equipped (73.89%), staffed (66.44%), shared between departments (61.54%) and institutions (53.65%), and provision of university program facilities is adequate (67.73%). student plants is the most done agriculture project with apiculture being the least done project.

The study findings compare well with other studies on student perceptions. For example, the study by Ongang'a, Nkurumwa, and Konyango (2014) on influence of selected factors on the choice of agriculture subject among secondary school students in Uiri Sub-County in Kenya found that students are motivated to choose agriculture because of available subject choice information in schools and effective teaching approaches. They also found that career awareness and teaching methods do influence students' choice of courses in higher education institutions. A study by Kochung and Migunde (2011) on factors influencing students' career choices among secondary school students in Kisumu Municipality in Kenya noted that male students are guided by learning experiences and career flexibility while the females depend on availability of opportunities on advancement and application of skills. The study is also in agreement with a study by Kidane and Worth (2014) study on student perceptions of agricultural education programme processes at selected high schools in KwaZulu-Natal Province, South Africa found that schools provided sufficient agriculture lesson coverage, notes, time and textbooks. However, schools had wasted uncovered class lessons, inadequate teaching materials, and shortage of qualified teachers of agriculture while students were of the view that there is insufficient infrastructure and support for agriculture in schools.

In the study, teachers ranked biology as the most popular

subject (84.85 %), followed by Agriculture (69.79%), computer studies (68.97%), chemistry (64.58%), and mathematics (61.86%) in secondary schools. The least popular course was technical drawing (29.11%) followed by food nutrition (29.41%). Teachers feel that agriculture is important to be taught in schools (84.22%), practical-oriented (74.34%), relevant to local farming systems (76.99%), and essential for university admission (78.07%). Many teachers indicated that they would like their own candidates join university to pursue agriculture (79.82%), opportunities exist in agriculture (79.46%), careers in agriculture compare well with other careers (76.31%), and young people should be encouraged to pursue careers in agriculture (90.35%). Teachers also think that agriculture profession is important in society (87.72%). Teachers also have positive attitudes towards training curricula in agriculture (63.3%) and careers in agriculture (54.87%).

The study found that 32.38% of the teachers had chosen agriculture as their first choice of undergraduate university course, 38.1% of them had agriculture as their second choice while 19.05% and 10.48% of the teachers choice agriculture as their third and fourth choice, respectively. The findings concur with other studies. A study by Okiror and Otabong (2015) on factors that influence career choice among undergraduate students in an African university context conducted at Makerere University found that students chose to study agriculture due to personal interest, agricultural job opportunities, farming background, parental advice or career guidance. The undergraduate students at Makerere University appeared motivated to pursue agricultural activities as farmers or employees after graduation. They further observed that many of secondary school students in Uganda do not prioritize agriculture as a course of study at University. Adedapo, Sawant, Kobba, and Bhise, (2014) studied determinants of career choice of agricultural profession among the students of college of agriculture in Maharashtra state, India, and found that choice of career of agricultural profession was influenced by personal interest, guidance or mentor, parents, media or contacts with agricultural experts, previous educational performance, childhood environment and work experience before admission into college of agriculture. However the study also observed that the majority of college students perceive agriculture as a stepping stone to other professions, poor man's job, capital intensive, laborious and rural people's job. In addition, there financial constraints, land acquisition, unpredicted future, climate change, and marketability of agricultural commodities do hinder continued professional development in agriculture.

Other studies on student choice of agriculture have been done. A study by Stair, Warner, Culbertson, and Blanchard (2016) on teachers' perceptions of common core state standards in agricultural education observed that teachers have positive attitudes about implementation of common core state standards in their programs but they felt challenged in implementing the standards because of not being consulted and the ever-changing cycle of educational initiatives. McGraw, Popp, Dixon, and Newton (2012) study on factors influencing job choice among agricultural economics professionals found that job responsibilities, positive work environment, good salary, family time, adequate resources, and professional and social interaction have a positive impact

on decisions students make on selection of jobs upon graduation.

Majority of teachers had university orientation programs (91.15%), which should be encouraged in universities (92.92%). Teachers also had university student associations (94.7%), which were necessary (89.39%), had links with other associations (73.45%) and should form more links with other university associations (89.29%). It was also noted that 64.54% of teachers had a student program bulletin during their university training.

It was observed that teachers' university expectation was fulfilled (53.15%) and met in relation to teaching quality (69.3%), teaching facilities' quality (66.36%), and quality of social life (71.68%). Teachers feel that university lecturers are committed to their undergraduate work (85.85%), knowledgeable and competent (76.42%), responsive to students' needs (65.09%), easily accessible (60%), adequately facilitated (68.57%), highly motivated (60.58%), and have a high degree of integrity. It was also noted that 55.75% of the teachers had their expectations changed since their graduation from university. However, the findings suggest that teachers have positive views agriculture as a subject or career. This is important in post-secondary agricultural education focusing on development and sustainability of food security in East African region. This argument concurs with Davis, Ekboir and Spielman (2008) study on post-secondary agricultural education and training in sub-saharan Africa. They argue that agricultural education and training is likely to contribute to agricultural development by strengthening capacity to innovate in agriculture and introduce new products and processes that are socially or economically relevant to smallholder farmers and agents. Also Mulder and Kupper (2006) observe that merging of regional and supra regional sectoral cooperation is important in fostering future agricultural education in the Netherlands. They argue, further, that more attention should be given to organization of knowledge infrastructure to stimulate effective cooperative knowledge production and learning.

The study found that parents' popular courses they are likely to recommend for their children are biology (68.35%), computer studies (67.07%), health science (66.67%), chemistry (65%) engineering (63.1%), mathematics (57.32%), economics (53.75%), and agriculture (53.57%). Majority of parents are of the view that agriculture profession is important to society (93.67%), and young people should be encouraged to pursue studies in agriculture (88.42%). They are of the view that agriculture should be taught in all schools (88.04%) and candidates should be encouraged to pursue further studies in agriculture (81.06%). The parents also feel that agriculture is essential for admission to university (75.79%), careers exist in agriculture (71.58%). Parents feel that agriculture is practical-oriented (71.53%), and students perform well in national agriculture examinations (70.52%). They feel that careers in agriculture compare well with other professions (64.21%) as school agriculture relates well to local farming systems (60%). However, only 56.99% of parents are satisfied that agriculture training meets community's needs while 56.85% of them value business in agriculture. The results also show that 53.69% of parents

think that community members value careers in agriculture while 51.06% of them feel that agriculture teaching resources are adequate in secondary schools. Based on these results, it is evident that secondary school parents have a positive attitude towards secondary school agriculture and careers in agriculture. The results compare well with Yadav and Ali (2016) study on Parents perception towards inclusion of agriculture in school curriculum in India, which found that parents who were older in age, farmers and landowners have positive attitude towards inclusion of agriculture as a subject in schools.

VII. CONCLUSION

It can be argued that a career in agriculture is important to the community but is not highly regarded by parents and students although universities have good and well equipped facilities for agricultural training.

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