INFLUENCE OF SELECTED FACTORS ON SUSTAINABILITY OF AGRICULTURE PROJECTS INITIATED BY EGERTON UNIVERSITY STUDENT TEACHERS IN SECONDARY SCHOOLS IN NAKURU COUNTY

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Thesis Submitted to the Graduate School in Partial Fulfilment of the Requirements for the Award of the Degree of Master of Science in Agricultural Education of Egerton University

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DEDICATION

This thesis is dedicated to my husband Peter Chege; children Christine Waceke, Kelvin Kamau, Jakes Kariuki and Favor Wambui for their patience, consistent prayers and unreserved support throughout the struggle of the long journey in accomplishing this work.

ACKNOWLEDGEMENT

I would like to thank almighty God for giving me the gift of life without which I would never have written this document. I also thank Dr. Washington Ochola and Dr. Joash Kibett, two important facilitators of my intellectual development; they have provided that essential combination of challenge and support which has enhanced my learning.

ABSTRACT

Agricultural Education faces many constraints among them lack of teaching and learning resources during classroom instruction. Egerton University has tried to solve the problem by making it compulsory for students on teaching practice to initiate projects in the secondary schools they get posted to. Preliminary studies have shown that majority of Agriculture Teaching Practice Projects (ATPPs) in Nakuru County secondary schools, collapse shortly after their completion and departure of the student teachers. The reasons for their lack of sustainability have not been investigated and documented. The purpose of this study was to investigate the influence of selected factors on sustainability of ATPPs initiated by Egerton University student teachers. This study employed a cross-sectional survey research design. Thirty three (33) secondary schools were sampled using proportionate random sampling technique from the 75 schools that had hitherto received student teachers from the university over the years 2001-2005. Simple random sampling technique was used to select two projects from each of the 33 schools. The headteachers and agriculture teachers from these schools were automatically selected. An observation profoma, two questionnaires and a student perception scale were used to collect data. Frequencies and percentages were used to describe the data based on the stated objectives and variables, while Chi-Square, ANOVA and Pearson's product moment correlation coefficient were used to test the hypotheses at 5% level of significance. The study revealed that the ATPPs are only moderately sustained in secondary schools and that some project factors (involvement of the stakeholders, project organization, level of project attractiveness, level of complexity of husbandry techniques of projects, level of inclusion of high valued crop or animals, level of student involvement in decision making) have a significant influence on the sustainability of the projects. The failure by TP students to make proper continuity arrangements during project design, implementation and hand-over, is a major contributor to sustainability levels. The study recommends, among others, that Egerton University should review their agriculture teacher training programme to include a course in project management. The University should also revise the policy on planning and implementation of ATPPs and work closely with the secondary schools and the ministry of education during project planning and implementation.. The projects, if sustained, can continue providing the much needed teaching and learning resources in secondary schools.

TABLE OF CONTENTS

DECLARATION AND RECOMMENDATION ii

COPYRIGHT iii

DEDICATION iv

ACKNOWLEDGEMENT v

ABSTRACT vi

TABLE OF CONTENTS vii

LIST OF TABLES xi

LIST OF FIGURES xiii

LIST OF ABBREVIATIONS AND ACRONYMS xiv

CHAPTER ONE 1

INTRODUCTION 1

1.1 Background Information 1

1.2 Statement of the Problem 4

1.3 Purpose of the Study 5

1.4 Objectives of the Study 5

1.5 Research Hypotheses 6

1.6 Significance of the Study 6

1.7 Scope of the Study 7

1.8 Assumptions of the Study 8

1.9 Limitations of the Study 8

1.10 Definition of Terms 9

CHAPTER TWO 10

LITERATURE REVIEW 10

2.1 Introduction 10

2.2 Agricultural Education 10

2.3 Emerging Trends in Agricultural Education 11

2.4 Teaching Practice 11

2.4.1 Supervisors and their roles 12

2.4.2 Student teachers and their role 12

2.4.3 Role of cooperating (agriculture) teacher during TP 13
2.4.5 Role of the headmaster during TP 13
2.5 Teaching and Learning Resources 14
2.6 Teaching and Learning Methods 14
2.6.1 The Project Method 15
2.6.2 Aims of using projects as a tool for teaching/learning 15
2.6.3 Advantages of Project Method 15
2.6.4 Limitations of the Projects 16
2.7 Teaching Practice Projects 16
2.7.1 Science Teaching Practice Projects 16
2.7.2 Agriculture Teaching Practice Projects 17
2.8 Project Sustainability 22
2.8.1 Measuring Sustainability using Indicators 23
2.8.2 Principles and Definitions 23
2.8.3 Selection of Issues 24
2.8.4 Construction of Indicators 24
2.8.5 Evaluation of Sustainability Indicators 24
2.9 Theoretical Framework 25
2.10 Conceptual Model 25

CHAPTER THREE 28

RESEARCH METHODOLOGY 28

3.1 Introduction 28
3.2 Research Design 28
3.3 Location of the Study 28
3.4 Target Population 28
3.5 Sampling Procedures and Sample Sizes 29
3.6 Instrumentation 30
3.6.1 Validity of Research Instruments 30
3.6.2 Reliability of Research Instruments 31
3.7 Data Collection Procedures 31
3.8 Data Analysis Procedures 32

CHAPTER FOUR **36**
RESULTS AND DISCUSSIONS **36**
4.1 Introduction 36
4.2 Subjects Characteristics 37
4.2.1 Characteristics of ATPPS 37
4.2.2 Characteristics of project factors 38
4.3 Testing of Hypotheses 43
4.3.1 Objective One. 43
4.3.2 Research Question 43
4.3.4 Objective two. 45
4.3.5 Hypothesis one: 45
4.4 Objective 3. 49
4.4.1 Hypothesis Two 49
4.5 Objective 4:. 57
4.5.1 Hypothesis Three 57
4.6 Objective 5. 60
4.6.1 Hypothesis 4: 60

CHAPTER FIVE **63**
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS **63**
5.1 Introduction 63
5.2 Summary 63
5.3 Conclusion 65
5.3.1 ATPPS sustainability index and level 65
5. 3.2 Influence of project factors on ATPPs sustainability 65
5.3.3 Influence of school characteristic 66
5.3.4 Relationship between headteachers' perceptions towards ATPPs on sustainability levels of ATPPs 66
5.3.5 Relationship between agriculture teachers' perceptions towards ATPPs on sustainability levels of ATPP 66
5.3.6 Relationship between secondary school students perceptions on ATPPs on sustainability levels of ATPPs 66

5.4 Recommendations 67
5.5 Recommendations for Further Research 68
REFERENCES **70**
APPENDICES **75**
APPENDIX A: OBSERVATION PROFOMA **75**
APPENDIX B: HEADTEACHER'S QUESTIONNAIRE(AGRICULTURE TEACHING PRACTICE PROJECTS) **78**
APPENDIX C: QUESTIONNAIRE FOR AGRICULTURE TEACHERS **82**
APPENDIX D: PERCEPTION SCALE FOR SECONDARY SCHOOL STUDENTS **87**
APPENDIX E: SAMPLING FRAME (LIST OF SECONDARY SCHOOLS IN NAKURU **89**
APPENDIX F: TP PROJECT MARKING SCHEME **91**
APPENDIX G: GUIDELINES FOR AGRICULTURE PROJECT WORK 92
APPENDIX G: LETTER OF RESEARCH AUTHORIZATION **95**
APPENDIX H: RESEARCH PERMIT **96**

LIST OF TABLES

Table 1: Population and samples of headteachers, agriculture teachers and projects 30
Table 2: Summary of data analysis procedures 34
Table 3: Frequency distribution of the sustainability indicator levels 38
Table 4: Frequency distribution of types of agriculture teaching practice projects (atpps) 40
Table 5: Frequency distribution for project factors 40
Table 6: Frequency distribution of the schools according to location, status and school type 41
Table 7: Frequency dstribution of head teachers and agriculture teachers according to their level of formal education 42
Table 8: Frequency distribution of the headteachers and agriculture eachers according to gender 42
Table 9: Frequency distribution of the headteachers according to their area of specialization 42
Table 10: Descriptive statistics of project sustainability indicators and overall index 44
Table 11: Pearson product moment correlation coefficients between selected project factors and sustainability 46
Table 12: Cross tabulation between project type and sustainability of the atpps 47
Table 13: Bivariate correlation coefficients between type of continuity arrangement and project sustainability 48
Table 14: Descriptive statistics 49
Table 15: Descriptive statistics of atp project sustainability indices according to school location 50
Table 16: Descriptive statistics of atp project sustainability indices according to school category 51
Table 17: Summary results of one-way anona test of significant differences in the various project sustainability indices by school category 52
Table 18: Cross-tabulation of atp project management classes according to school status 53
Table 19: Cross-tabulation of atp project utilization classes according to school status 53
Table 20:Cross-tabulation of atp project lifespan classes according to school status 54

Table 21: Cross-tabulation of atp project completion classes according to school status 55
Table 22: Cross-tabulation of atp project sustainability classes according to school status 56
Table 23: Pearson's product moment correlation coefficients between headteacher and agriculture teacher perceptions and sustainability of tp projects 58

LIST OF FIGURES

Figure 1: Conceptual framework showing the factors influencing ATPPs sustainability 27

Figure 2: Distribution of TP projects by age – year of initiation 39

Figure 3: Relative scores of headteachers' perception towards projects initiated by Egerton University students on TP in Nakuru County 58

Figure 4: Relative scores of agriculture teachers' perception towards projects initiated by Egerton University students on TP in Nakuru district 60

LIST OF ABBREVIATIONS AND ACRONYMS

AGED	Agricultural Education
ATPPs	Agriculture Teaching Practice Projects
EU	Egerton University
EXT	Extension
FAO	Food and Agriculture Organization
K.C.S.E	Kenya Certificate of Secondary Education
KNEC	Kenya National Examination Council
KIE	Kenya Institute of Education
LFA	Logical Framework Approach
MOARD	Ministry of Agriculture and Rural Development
MOEST	Ministry of Education Science and Technology
NCTE	National Conference on Teacher Education
NDDP	Nakuru District Development Plan
SIDA	Swedish International Development Agency
TP	Teaching Practice

CHAPTER ONE
INTRODUCTION

1.1 Background Information

Project method is an active learning strategy where learners rather than being taught are engaged in applying knowledge. In the process, learners develop initiative, creativity and judgement (Kliebard, 2004). The projects emphasize application of knowledge and skills to solve real problems in the schools. This is in agreement with Lubben and Campbell (2006), who noted that, project work, helps learners to select and apply scientific knowledge to solve real world problems. Kasanda (2007) notes further that, project work enables learners to acquire ability to use investigative skills to identify deficiencies and design valid approaches in problem solving. Newcomb, McCracken, Warmbrod and Whittington (2004), pointed out the superiority of project approach over case study method in training students for action. They argue that students' projects require the student to organize, analyze and synthesize and this leads to the development of skills like self-direction, problem- solving, decision-making and community skills. The unique thing about these skills is that they are transferable and provide a better preparation for life than other methods (Ndirangu, 2000).

The project method was historically and is still advocated as an important part of an agricultural program that provides application of concepts taught in class. According to Harlin (2007), identifying theory and best practices of project method yields six themes; 1) the purpose of the projects; 2) the project classification; 3) the process; 4) the context 5) individual vs. group; and 6) the teachers role. The purpose of projects in agricultural education has expanded beyond the skill acquisition and proficiency to include personal development for diverse career preparation (Newcomb, at el, 2004). This could be said to be true with the Agricultural Teaching Practice Projects (ATPPs). The project method has been used to develop the career of an agriculture teacher. Historically, projects were classified based on the purpose or outcome (Kilpatrick, 1918). Kilpatrick proposed classification of two types of projects, type one or producer's projects is tangible product. In this study ATPPs could be classified as type one projects because one of the outcomes of the project is to produce a tangible More recent approaches specifically in agricultural education use a combination of learner action and the purpose of the project (Talbert,

2005). product in form of teaching and learning resources and generation of income as well as production of food especially where crops and livestock are included in the projects.

Egerton University like many other universities uses the project method in its teacher education programme. The student teachers' projects are important in two aspects: first, through projects the student teachers develop the problem solving skills and two, once implemented, the projects enable the schools acquire the much needed teaching and learning resources for classroom instruction. The student-teachers carry out their project work in schools where they go for teaching practice, (Mwangi, Muguchia and Rutatora, 1996).

Teaching practice at Egerton University is a twelve-week period whose main purpose is to allow the student teachers to observe and participate in teaching subjects in their areas of specialisation (Mwangi, Muguchia and Rutatora, 1996). The student teachers include those pursuing diploma and bachelors' degree in agricultural education and extension (AGED & EXT). Teaching practice is done under the supervision of university supervisors and experienced cooperating teachers in secondary schools (weeks, 2006) Teaching practice is viewed as a bridge between academic theory and educational practice (Dove, 2004). During this period, the student teachers are expected to develop and demonstrate maturity in applying instructional and management principles and practices learned during their training (Knoll, 1996). The student teachers are posted to counties like Kericho, Laikipia, Nyeri, Nakuru among other counties (Kibett, 16th July 2006, Personal communication).

Selection of the Agriculture Teaching Practice Projects (ATPPs) in the secondary schools is the work of the student teachers. Ideally, the students are supposed to plan, execute and evaluate the entire project for themselves (Mwangi, Muguchia and Rutatora, 1996). The university supervisor only acts as a guide and resource person in helping the students select a suitable project (Ombati, 16th June 2005, personal communication). The project should fall within the requirement of the syllabus. Where time permits individual students or groups of students should feel free to carry out projects outside the syllabus. This is meant to satisfy their curiosity and interests so long as the project meets other useful criteria. The project should consist of real learning activities, that should result in learning experiences, it should also be feasible in terms of availability and cost

of materials and equipment, time, land and other resources required, the project should stimulate creativity and integrate theory and practice (Mwangi, Muguchia and Rutatora, 1996).

Common projects initiated in secondary schools can be classified as crop or animal - related projects. Crop related projects include intensive small-scale production of variety of fruits, and vegetables (citrus, pears, plums, cabbages, kale, onions, carrots, tomatoes, cucumbers, and potatoes), growing traditional food and cash crops such as maize, sorghum, beans, tea, pyrethrum, and coffee. According to Muguchia Mwangi & Rutatora (1996), Pasture grasses and legumes, silage maize and hay making, improving the school compound through landscaping, establishing museum plots, Soil and water conservation, Agroforestry, and establishing cribs for grain storage and compost making are some of the recommended projects that can be initiated secondary schools by the student teachers from Egerton University. They continued to add that livestock related projects commonly selected by student teachers include, rearing and management of 200 to 500 layers or broilers. 2-3 sows and litters, 2-3 dairy cows and calves (calf pens, milking parlours), Ewes and lambs, Zero-grazing units for sheep, goats or cows, rabbit keeping and bee keeping (beehives, apiary),establishing a fishpond, cattle dip, crushes and erecting a fence are among projects popular with student teachers. Establishment of these projects normally follow the common project cycle of preparation, planning, implementation and evaluation (Kibett, 2002).

According to SIDA (2004), it is important to involve stakeholders during project selection to ensure project sustainability. A careful observation of possible stakeholders of ATPPs in secondary schools may lead to the head teacher and perhaps the agriculture teachers. Previous studies have shown that conflict arises from the administrators who must bear the ultimate responsibility for projects they do not really want, or understand (Sheffield 1976). The agriculture teacher in the schools is also the cooperating teacher. He provides most of the information about the projects to the student teacher (Botswana University, 2006). He serves as a resource person in planning, implementation, financing and maintenance of the agriculture projects. Project work is very demanding to the teachers and those who succeed in this area are usually highly motivated and hardworking individuals who contribute a large amount of managerial skills to the effectiveness of a particular approach (Sheffield, 1976). Agriculture

teachers argue that they do not get higher salaries for the extra work. Sometimes they have to work during vacations.

The secondary school students are the other important stakeholders. They use the projects during classroom instruction, consume the projects' produce and may be given various duties within the projects. Other stakeholders may include the school community as a whole. (Karlsson, Rylander, Illes, and Sund, 2007), argue that earnest efforts to plan collaboratively with the true stakeholders prior to implementation of a project, increases the likelihood of smooth implementation and the degree of stakeholder ownership and readiness to work towards sustainability. According to (SIDA, 2004) it is important to analyse the risks and assumptions so as to assess whether the project can continue by itself, without external support, i.e. sustainable in the long term.

According to Fort Devens Charette Steering Committee (1993), indicators of measuring sustainability for projects in general can be derived from the purpose or the objectives of initiating those projects. The primary objective of initiating TP projects by student teachers from Egerton University is to provide teaching and learning resources in secondary schools (Githua, 1999). A secondary objective is to produce cost effective benefits, which may help to prove that Agriculture is a dignified and profitable enterprise (KIE, 2002). This is one of the aims of teaching agriculture in secondary schools. The benefits obtained from these projects include; supply of foods like eggs, milk, meat, vegetables, fruits and cereals. In this study, indicators of sustainability will therefore be taken as the level of the projects' utility in the school and the number of projects that remain in existence after the departure of the student teachers.

1.2 Statement of the Problem

Preliminary information points to collapse of majority of ATPPs shortly after their completion and departure of the Egerton University student teachers from cooperating teaching practice secondary schools. This problem affects attainment of education goals by denying schools the much needed agriculture teaching/ learning resources generated by the projects. In addition, the schools do not benefit from income and food that would otherwise be obtained from the projects if sustained. The projects are funded by the schools and failure to sustain the ATPPs points to misappropriation of schools' funds. Research done previously on science teaching practice

projects showed that Science teaching Practice projects are durable and easily sustained. However most of the science teaching practice projects are kept indoors in laboratories and are not exposed to environmental conditions. Previous studies have shown that environmental factors have an influence on sustainability of agricultural projects. In addition, most agriculture projects deal with living systems that have continuous requirements that would affect their sustainability. Agriculture projects must be highly organized simply to keep plants and animals alive. The situation is made worse by lack of follow up of the projects by Egerton University. No studies have been done to determine the factors that influence sustainability of these projects. This study aimed to determine the influence and relationships of project factors, school characteristics and whether there is a relationship between Headteachers , Agriculture teachers' and secondary school students' perceptions towards ATPPs and projects' sustainability.

1.3 Purpose of the Study

The purpose of this study was to determine the influence of selected factors on the sustainability of ATPPs initiated by student teachers from Egerton University in secondary schools in Nakuru County.

1.4 Objectives of the Study

This study was guided by the following objectives

i. To determine the level of sustainability of ATPPs initiated by Egerton university student – teachers in secondary schools in Nakuru County.
ii. To determine the influence of project factors on the sustainability of ATPPs initiated by Egerton university students-teachers in secondary schools in Nakuru County.
iii. Determine the influence of school characteristics on the level sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.
iv. To determine the relationship between headteachers perceptions towards ATPPs and the sustainability levels of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.
v. To determine the relationship between agriculture teachers' perceptions towards ATPPs and the sustainability levels of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

vi. To determine the relationship between secondary school students' perceptions towards ATPPs and the level of sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County .

1.5 Research Hypotheses

The following hypotheses were tested at 5% level of significance:

H_{o1}: There is a low sustainability level of ATPPs initiated by Egerton University student teachers in secondary schools in Nakuru County.

H_{o2}: There is no statistically significant influence of project factors on sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

H_{o3}: There is no statistically significant influence of school characteristics on sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

H_{o4}: There is no statistically significant relationship between headteachers' perception towards ATPPs and the level of sustainability of the ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

H_{o5}: There is no statistically significant relationship between agriculture teachers' perception towards ATPPs and the level of sustainability of the projects initiated by Egerton university student teachers in secondary schools in Nakuru County.

H_{o6}: There is no statistically significant relationship between secondary school students' perception towards ATPPs and the sustainability of the projects initiated by Egerton university student teachers in secondary schools in Nakuru County.

1.6 Significance of the Study

Little attention has been paid to generate information regarding ATPPs in Kenya. These projects provide teaching and learning resources to secondary schools that are used during classroom instruction. They also generate income for the schools once the project products are sold. These enable students appreciate agriculture as a dignified and profitable enterprise. In some cases the products from the projects are in form of food that is consumed by the students hence making the schools to be more food secure. For schools to continue receiving these benefits, it is important to sustain the projects. This study aimed at establishing the factors that influence project

sustainability. The findings from this study revealed that project factors like type of the project, inclusion of a high valued crop or animal in the project, care of projects during vacations, level of project organization, level of project attractiveness, level of complexity of husbandry techniques, level of returns given to those who worked on the projects, level of students involvement in decision making e.g. in marketing and transportation of the produce from the projects increases the sustainability levels of the projects. The findings may be used to develop policy recommendations for improved agriculture curriculum implementation by the ministry of education. Teacher training programme at Egerton University and other tertiary institutions with teacher education programmes and TP projects may use these findings to train the agriculture teachers so as to produce students equipped with abilities to initiate sustainable projects. This will also motivate the students to appreciate the project method as used in teaching. It was also hoped that this study would form the basis for further research in the field of ATPPs. Finally, the ministry of education can use the method used in this study to develop sustainability levels of schools' projects and use the same to measure the performance of various teachers including the headteachers.

1.7 Scope of the Study

The study was limited to selected factors namely school characteristics, project factors, head teachers, agriculture teachers and secondary school students perceptions towards ATPPs in Nakuru County secondary schools. The study was limited to secondary schools that have received student teachers from Egerton University over the years 2001-2005. Observation of projects in these schools would help to determine the level of projects' sustainability. Key elements of sustainability that were observed in the existing projects included, the time frame of the projects, level of project utilization by teachers, students and the schools' community, conditions of the projects and the level of completion, and finally the ratio of the number of the projects in existence versus those initiated. The project factors that were studied included; Types of projects, and project inherent factors. Data was collected from rural and urban schools, Provincial, District and Private Schools, day and boarding schools.

1.8 Assumptions of the Study

The study assumed that there was no external institutional support for the ATPPs in schools where the projects had been sustained. External institutional support would imply that there were other external variables influencing sustainability of the ATPPs other than what was investigated in this study.

1.9 Limitations of the Study

The study had the following limitation:

The use of project as a means of evaluation performance during the teaching practice has not been very systematic during the training at Egerton University, for instance in some schools, the costs of the projects are prohibitive leaving the students teachers to go for simple and less sustainable projects.

1.10 Definition of Terms

The following operational definitions were used:

Cooperating Schools are the schools where the student-teachers undertake their teaching practice exercise.

Cooperating Teachers are the subject teachers in the cooperating schools who serve as mentors to student-teachers assigned to their classes.

Head Teachers are the principals of secondary schools

Project Factors – refers to the type of the project, number of years the project has been in existence, continuity arrangement made by the student teacher on the projects and the stakeholder involvement in the planning.

School Characteristics- these are school factors that were studied which include school type, school status, school location and school category.

School Category: classifying schools on the basis of whether they are National, Provincial, District or Private schools

School location: Classifying schools on the basis of whether they are situated in the rural or urban areas

School status: classifying schools on the basis of whether they are day, boarding or both day and boarding

Student teachers- Education students in tertiary institutions on teaching practice, in this study the term was used to refer to students from Egerton University on teaching practice.

Sustainability – This is the degree to which the positive changes of a project were maintained after external support was terminated (Pretty, 1994). In this study the terminology refers to the ability of a project to continue on itself without the input from the student- teacher from Egerton University

Sustainability Index –This is an index showing the level of sustainability of ATPPs. It was be obtained by compounding scores obtained from analysis of various factors observed from the projects as indicators of sustainability.

TP Project Sustainability Indicators – Refers to time frame, period of time the project has been in existence, utilization by teachers, students and school community, level of completion and the ratio of number of projects in existence versus number initiated.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter a review has been made of what other researchers have done in the field of Agricultural education. It begins by looking at trends in agricultural education and continues to teaching practice, how it is organised and supervised. It also looks at the project method, its usefulness, advantages and disadvantages. A detailed account of Science TP projects and Agriculture Teaching Practice Projects (ATPPs) has been given. Logical framework model, which is a project planning approach, has been discussed in details. This approach has been used by many organisations to plan successful and sustainable projects. Guidelines on agricultural projects in secondary schools have also been discussed. The procedure used in developing sustainability indicators has also been reviewed. This is followed by a theoretical and conceptual framework of the study. The chapter ends with a summary of the reviewed literature.

2.2 Agricultural Education

Agricultural education is special in comparison with other forms of education and training in that agriculture cannot be learned solely in the field or solely in the classroom. Practical training – such as traditional apprenticeship training – should ideally be complemented by more formal learning to enable many aspects of agriculture and rural development to be seen in their true perspective (Vandenbosch, et al, 2006). Evidence suggests that the traditional education-research-extension "triangle" may be increasingly ill-equipped to respond to new opportunities and challenges in agricultural education (Kroma 2003; Tadesse 2006). The entry of new actors, technologies and market forces, combined with new economic and demographic pressures, suggests the need for more innovative approaches to strengthening agricultural education (IFPRI, 2006). This has resulted into agricultural education and training, finding currently itself very much in an "adapt-or-perish" situation (Vandenbosch, et al 2006). The rationale for offering agricultural subjects to students is sometimes to counter the apparent negative attitude to farming. Opinions such as "the clever do not go into agriculture as they can make more money elsewhere" stem from a widespread perception that, a career in agriculture is unattractive (Adipala, et al 2009). According to KIE, 2008, one of the objectives of teaching agriculture in

schools is to portray agriculture as a dignified and profitable enterprise. This has been done purposely to address he negative perception.

2.3 Emerging Trends in Agricultural Education

On-going and emerging trends which are having and will continue to have important implications for agricultural education and training in Africa include the following (Maguire, 2000; Abalu, 2001; NEPAD, 2003, in Ngesa, 2006): Shift in focus from agriculture to rural development, rapid population growth rates and urbanization, HIV/AIDS, environmental degradation, unsustainable water use, unpredictable weather and climate change, increases in incomes and wealth, globalization, trade liberalization, and market deregulation, scientific progress including developments in biotechnologies, rapid developments in information and communication technologies (Adewale, Adesoji & Iroegbu). One of the current challenges of agricultural education is how to meet the challenge of providing for rural development rather than agriculture alone. Learning needs to emphasis inductive reasoning skills so that student can interpret problems and devise solutions (Ngesa, 2006). This kind of learning can be achieved through the use project method as noted by Newcomb (2004).

2.4 Teaching Practice

The term teaching practice is defined differently by different educationists. According to Adeoye at el (2008), teaching practice is a practical activity which the student-teachers are given an opportunity in actual school situation to demonstrate and improve training in pedagogical skill over a period of time. Teaching practice at Egerton University is a twelve week period where the students including those pursuing Agricultural Education and Extension are allowed to practice teaching under supervision (Ombati, 15th June, 2005, personal communication) Teaching practice provides opportunities for the student to develop and evaluate his or her teaching competences. The general aim of TP is to introduce prospective teachers to teaching and its routines under guidance of qualified professionals to develop skills, attitudes and competencies in the profession (University of Botswana, 2006). Some of the major inadequacies, in the present methods of organizing teaching practice include, only a fraction of the teachers' professional duties are assumed and supervised during teaching practice. Research has shown that science projects for students on teaching practice are not supervised adequately (Ndirangu, 2000).

The theoretical basis Teaching Practice (TP) for is perhaps informed by the general traditions whereby majority of the professional organisations do provide the "neophytes" some forms of prescribed pre-service training. This practice dates back to the time of apprenticeship under experienced bricklayers, blacksmiths, sculptors etc. in the traditional African society. TP in teacher education can be likened to similar clinical and field practice arrangements, such as Industrial Training, Horsemanship and other Students Work Services programme for would-be doctors, lawyers, engineers and pharmacists (Odeoye).

2.4.1 Supervisors and their roles

Supervision is the core of teaching practice exercise. Valid information on student teachers performance is obtained through supervision (Odeoye 2008). Egerton University lecturers serve as supervisors of Egerton University student teachers. It is expected that they would be practicing teacher educators and they should supervise students in their area of specialization. However, where specialists in specific subject areas are not available, teacher educators in other subjects could serve as supervisors. It is also recommended that each student should be observed by two different supervisors. The scores given by these two supervisors are then aggregated to get a mean which becomes the final score. Supervision should not aim at inculcating in the prospective teacher prescribed virtues based on predetermined modes of behaviour. Supervision should emphasise self-evaluation, it should make it possible for the student to develop the ability to make appropriate value judgment with regard to performance and effectiveness (Kasanda, 2007).

2.4.2 Student teachers and their role

Student teachers are the ultimate beneficiaries of the teaching practice. They must therefore be fully and responsibly involved to ensure the success of the exercise. Student teachers should not be introduced to actual off campus teaching until they have gone through the preparatory steps of demonstration teaching, microteaching and peer teaching. Classroom teachers should not be on "holiday" during teaching practice; rather they should always be available to give guidance to the student teacher (Newcomb, 2004). The training of teachers should be considered a co-operative venture between the institution that produces the teachers (training colleges) and those who

eventually make use of the products, the schools (National Conference on Teacher Education, 2006).

2.4.3 Role of cooperating (agriculture) teacher during TP

The cooperating teachers are very important in teaching practice programme. They have numerous and varied responsibilities in that they help the student teachers understand how to relate the job of teaching to the total school programme. This includes acquaintance with extra-curricular activities as well as the class activities (Botswana University, 2006)). The co-operating teacher also confers with the student teacher regularly and offers constructive criticisms of the methods used in teaching. Agriculture teachers always find themselves in conflicts with other members of the school especially the headmaster (Sheffield, 1976). This is due to the special nature of agriculture subject, For instance, the school farm requires extra finances as well as access to school's transportation to move produce to the market and labourers may be needed during holiday. This puts heavy additional load on the headmaster, hence the conflicts. According to), conflicts between the head teacher and the agriculture teacher have some negative effects. They include impediments to smooth working, diminishing output, obstruction in the decision-making process, and formation of competing affiliations within the school. It would be important to find out whether these conflicts exist in a school situation as this may reveal some information on factors that sustain projects in secondary schools.

2.4.5 Role of the headmaster during TP

Attitudes and perceptions are key elements in the relationships between administrators and agricultural science teachers (Starquadine, 2001). She further noted that that school administrators have the authority and influence in programs and curricula at the school and school system levels; changes in agricultural education require their approval and support. Without that support, programs in those schools will not develop or grow. Perceptions refer to an individual's current appraisal of an object, or program, as experienced in the immediate situation. Attitudes guide these appraisals, and current research states that attitudes do influence behavior (Vandenbosch et al., 2003). Teacher-principal relationships can affect performance outcomes (Thomas, 2004). The relationship between the principals and teachers is considered to have the greatest effect on the quality of life in a school (Barth, 2004). Principals need to be aware of their

role in fostering collegial, empowering relationships with all others in their school community (Parr & Edwards , 2004).

The role of the headmaster in TP is primarily administrative. The headmaster looks to the agriculture teacher as the person mainly responsible for the day to day running of the agricultural education programme of the school, and places most of the responsibilities on his or her shoulders (Alemayehu, 2006). According to Terry & Franklin (1987), there is an internal force, which arouses, regulates and sustains persons' more important actions. This is what they call motivation. It may be important for headmasters to understand the factors that influence motivation. This is because those teachers who succeed in project work are usually highly motivated (Sheffield, 1975). Positive reinforcement programmes are important in motivation (Hammer & Hamner, 1976; Tosi, Rizzo & Carroll, 1986). Vroom's, expectancy theory based on the concept that the level of performance is a multiplicative function of ability, and motivation is an indicator of how important this attribute is to an individual (Vroom, 1964), may explain why motivation to those who are directly involved in ATPPs is important. It may be vital to find out whether teachers and head teachers are motivated enough to take care of the ATPPs which calls for extra commitment and time.

2.5 Teaching and Learning Resources

The availability of teaching and learning support materials is among the most important determinants of effectiveness of post –primary agricultural education and training (Vandenbosch, 2006). Provision of adequate learning –related facilities and equipment is one of the greatest challenges that agriculture education systems face (World Bank, 2007). Kenya has reported serious shortages in instructional materials, (Ngesa, 2006). Laboratories tend not to adequately equipped (Ndejuru, 2006).

2.6 Teaching and Learning Methods

Many methods have been adopted in the teaching of agriculture. Some of them include field trips, demonstrations, lecturing, group discussions, practical methods, project method and apprenticeship training.

2.6.1 The Project Method

Caste (1967), defined a project as a co-operative study of a real life situation by an individual, a class, or even by the whole school, under the guidance of a teacher. Due to the high motivational value and appropriateness in achieving course objectives, projects make instruction practical and meaningful to the learners (Ethiveerasngam, 1990). In agriculture they broaden the learner's practical experience, particularly where crops and animals are involved. Most educators have realized that to be effective, instruction in agricultural education must be carried out to the doing level (Ngesa, 2006).Teaching and learning are exciting only when both teacher and students are highly motivated and when teachers know their subject well and are able to communicate the same to student effectively (Cropley & Dave, 1978).

2.6.2 Aims of using projects as a tool for teaching/learning

Projects bring students into contact with the actual environment (Dow, 1979). This enables the learners to find links between their classroom work and actual experience in real life (Bruner, 1996), that is, integrate theory and practice, knowledge and action. They offer students an opportunity to tackle real life problems and to solve them by working and thinking individually and sometimes collectively as a group (Kibett, 2002). They also enable students to develop skills and knowledge in agriculture (Zonon, 2oo6). Finally projects enable learners to develop an appreciation of the purpose and value of what they learn and this motivates them to learn more (Ngumy, 1985).

2.6.3 Advantages of Project Method

A project brings learners closer to the reality and enables them to deal with problems encountered in real life. In this way it enables them to connect or associate themselves with life out of campus. It is a type of experiential learning. Learners carrying out projects collectively learn to work cooperatively with other people (particularly students, parents and teachers) and to contribute to community improvement. Projects arouse the interest of learners stimulating and motivating them to seek more knowledge in the area of the project (Rodgers, 1986). Learners carrying out individual projects develop a sense of responsibility to earn, use and save money and to have independence and creative thinking. The project method can be used reliably to assess individual talents. It is a learner-centered participatory method that gives students an opportunity to develop the abilities they need for proficiency in agriculture. It develops students'

originality, pride of ownership initiative, self-confidence and managerial ability while giving students opportunities to contribute to desirable family living (FAO, 2006). It develops in students' desirable habits, understanding appreciation ideals, abilities and attitudes through challenging true-to-life situations. A project gives students the opportunity to plan, work, make budgets, use financial agreements, review information, form judgments, evaluate activities, make decisions, solve problems, implement plans and keep accurate records (World Bank, 2005). It also gives students and teachers the base for evaluating the effectiveness of the instruction in agriculture.

2.6.4 Limitations of the Projects

Projects are expensive in terms of resources, time and money required for implementation. Space can also be a limiting factor especially in school (Ngumy, 1985). It is not easy to get a project that will interest all the students equally and participation in the project work varies especially when the learners are working as a group (Sheffield, 1975). Assessing project is time consuming and objectivity in assessment is hard to achieve (Adeoye, at el 2008). Projects may be affected by factors beyond students' control for example crop growing projects are mostly weather dependent where irrigation is not feasible. When rain fails, learning is adversely affected and learners may be frustrated and disappointed. The reality is that only 34% of projects are delivered on time and on budget (FAO, 2006).

2.7 Teaching Practice Projects

An examination of literature to identify theory and best practices associated with project method yielded six themes (Roberts 2007): The purpose of the project, project classification, the process, the context, individual vs. group and the teacher's role. Teaching Practice projects can also be studied in this perspective.These are projects initiated by student teachers from Egerton University and other tertiary teacher training institutions in secondary schools where teaching practice is done. Some students initiate agricultural projects while others start science projects mainly in chemistry, physics, mathematics and biology.

2.7.1 Science Teaching Practice Projects

Most science TP projects are durable and easily sustained in secondary schools (Ndirangu, 2000). He further added that to avoid some student teachers feeling that they were inadequately

prepared to undertake the science learning materials student preparation is important. Science teaching practice projects are generally teaching aids used during classroom instructions (Githua, 1999). There is need to evaluate the student teacher preparation and areas of weakness should be ironed out (Adeoye, 2008). Student teachers need to understand the philosophical and procedural conceptualization of the project materials well in order to handle all aspects of the learning materials confidently (Ngeasa,2006). Science teachers in schools support the materials because the materials are usually left behind after teaching practice is completed. It is hoped that regular teachers, use the materials to improve their teaching. The materials are perceived to provoke the learners' interest in learning science. They are also perceived to be inexpensive and thus cost effective because they are constructed using local materials (Githua, 1999). More time should be provided for tutors/supervisors to visit the student teachers at all stages in the teaching material, conceptualisation, preparation and evaluation. Such a move may ensure tutors are readily available to provide assistance to the student teachers when needed. This may also contribute to improving the quality of science materials that are made (Ndirangu, 2000).

2.7.2 Agriculture Teaching Practice Projects

These are the projects initiated by students, from Egerton University and other tertiary institutions, pursuing Diploma and bachelors of Science in Agricultural Education and Extension. The students are expected to write a proposal, initiate and develop to completion an agricultural project in secondary schools. The projects initiated should be relevant to the agricultural curriculum and reinforce practical aspects of agricultural education (Mwangi, Muguchia and Rutatora, 1996). These projects can be carried out in the school farm or in agriculture workshop.

Ideally, schools teaching agriculture should have a minimum of one hectare of land, which is ready for immediate use in teaching of agriculture (Ngumy, 1985). The land is usually given various names, school farm, school shamba, school garden, demonstration farm or unit, experimental farm or land laboratory. The main role of the piece of land is to reinforce the classroom teaching of agriculture. Kathuri (1990) reported that most schools teaching agriculture had a school farm. However, he found that most farms lacked projects, equipment, facilities and financial support. This made the teaching of agriculture in those schools less effective since the

teachers found it difficult to organise practical work, owing to inadequate financial support. The teachers could not also establish demonstration plots and crop museums. K.I.E (2002), recommend the following sections of a school farm.

1) **Demonstration Plots**: - These are plots measuring approximately five metres square for experimenting with different crops. They are also used to demonstrate good husbandry practices e.g. weeding, fertilizer application and thinning. They are primarily for use of teaching rather than for generating money. However, schools should endeavour to make the projects self-sustaining (KIE, 2002). TP students can carry out a project in creation of these demonstration plots in the secondary school and identify them appropriately.

2) **Museum**: an area, set aside for growing different crops in small quantities for students to study. Sometimes the teacher may plant such crops so that he may obtain specimens for classroom instruction within the locality. Each species of planted crop should be well labelled. The museum should be well maintained and should be used to demonstrate the management practices of crops. Again a TP project may deal with creation of a crop museum in the school farm.

3) **Project Plots**: Individuals or groups of students, in a class or clubs run these projects. Whether this section will be organised as one unit or whether some pupils will be allowed individual plots to cultivate by them depends on the point of view of the teachers and will therefore be found to vary. A compromise is usually the best solution to this question: the pupils in the junior classes having their own independent "class" plot, and the pupils in the senior classes being responsible for individual plots. The agriculture teacher makes constant visits to the project plots and gives advice where necessary (Kibett, 2002)

4) **Commercial Garden Farm:** This the area of the school farm in excess of the demonstration plots; crop museum and project plots should be treated as a commercial enterprise. This means that the farm should be run using money generated by it (Ngumy, 1987). The farm may be used as teaching resource where pupils are taught practical skills.

2.7.2.1 Common ATPPs Initiated in Secondary Schools

ATPPs commonly initiated in secondary schools can be divided into various categories according to the way the topics appear in the syllabus. The syllabus covers crop production, livestock production, farm power and machinery, farm structures, agricultural economics and agro forestry. These are distributed throughout the four-year course.

An attempt has been made to arrange the topics in a logical sequence. However due to different ecological zones and weather patterns in the country, teachers are advised to take into account these differences when selecting various crops and animals (K.I.E, 2002). It is highly recommended that a crop museum be established in each school. Students are also be encouraged to plant suitable trees in their schools and label them using common and botanical names. Each school is encouraged to harvest its rainwater from roof catchments, hold it in reservoirs and uses it for irrigation and for livestock, among other uses. Rainwater harvesting does not only provide cheap water to the school, but also prevents soil erosion and undermining of building foundations. Since most farming activities require water, projects that aim at harvesting water would be a good starting point for many secondary schools. Agriculture and other related activities must not be used as punishment for wrong doers as this instils a negative attitude towards agriculture (Kathuri, 1996).

Common livestock projects initiated by student teachers from Egerton University include; zero grazing units, rabbitries, calf pens, poultry - deep litter and slatted floor-, piggeries, beehives and fishponds. Among the crop projects are, crop demonstration plots, crop museums, and establishment of perennial crops like coffee, tea and bananas. Farm structure projects popular with student teachers include construction of animal handling structures like crushes and fences. Keeping of farm records is a common project chosen from agricultural economics topics. In agro forestry, student teachers initiate tree nurseries and identify trees in the school compound using both common and botanical names. Another popular area involves the preparation of teaching aids (Mwangi, Muguchia and Rutatora, 1996).

Teaching aids prepared during teaching practice are intended to provide an opportunity for the student teachers to practice skills learnt in educational technology (Ndirangu, 2000). These

teaching aids are intended to help schools teach specific areas of the syllabi content. The student teachers are encouraged to show creativity not just replicate what is in existence in order to increase the stock of teaching materials in schools (Githua, 1991). Ayot and Wanga (1987) contend that, teaching aids are important because they are likely to increase learning by engaging the learner in practical activities.

The learning activities enable teachers to move away from the characteristics abstract scientific theories taught from their application. Teaching aids attract attention of the students (FAO, 1992). This is because in any classroom, there are many detractors that compete with the teacher for student's attention (Bruner, 1961). Teaching aids help the teacher to remove at least some of these detractors and to get the students' full attention. They also serve as reference points for later remarks and questions (FAO, 2006). Unlike spoken word, the aids are tangible and the teacher and the students can always come back and build on them (Rogers, 1986). The common teaching aids prepared by AGED student teachers include: photograph albums, charts, models, and preparation of samples and specimen.

2.7.2.2 Requirements for Successful ATPPs

A project must be planned by the student teacher with the guidance of the supervisor. The student teachers should be allowed to select a project in an area in which they are interested so that they can devote their time enthusiastically in the project (Kibett, 2002). The project and each section of it must be clearly defined and its purpose easily understood. The project must fully engage the learners lasting interest. It must also be worthwhile in that, it is not merely pleasure giving or make believe, or just to occupy student teachers' time. A good project must awaken curiosity and create a demand for new information. The project must have a time limit. TP projects are supposed to last for a whole term. The schools should then sustain the projects. Any skills the learners may require should be demonstrated before the project commences (Mwangi, Muguchia and Rutatora, 1996). There is need to enlighten the student teachers on the above list of factors to enable them plan for successful projects.There tends to be a natural sequence in the way agricultural projects are planned and carried out. This sequence is often called the "project cycle" (Sida, 2004). The cycle recommended by department of Agricultural Education and Extension is, selection of project, project planning, project implementation, report writing,

evaluation and selection of another project. Assessment involves evaluation of all these stages of the TP project cycle ((Mwangi, Muguchia and Rutatora, 1996).

2.7.2.3 Selecting a Project

The learners should plan, execute and evaluate the entire project for themselves (Knoll, 1997). The teacher should act as a guide and resource person in helping the learners select a suitable project. The project should fall within the requirement of the syllabus. Where time permits, individual learners or groups of learners should feel free to carry out projects outside the syllabus to satisfy their curiosity and interest so long as the project meets other useful criteria ((Mwangi, Muguchia and Rutatora, 1996).The project should consist of real learning activities whose aim should not be just to keep the learners busy but which should result in learning experiences. The project should be feasible and practical in terms of availability and cost of materials and equipment as well as time, land and other resources required. Some projects fail to take off because they are too ambitious. The project should be within the learners' needs, interests, educational level, and physical capabilities and should also be appropriate for the age group of the learners (Ombati, 15th June 2005, personal communication). The project should stimulate creativity such as new ways of using locally available materials more efficiently. It should help pupils discover new knowledge especially how to solve problems that confront the learners and community at large. The project should integrate theory and practice. In other words, it should relate what is learned in the classroom with reality. It is wrong to choose or select a project without clear objectives in mind. A common failure is to use projects without an analysis of the knowledge and skills that will be learned or reinforced.

2.7.2.4 Planning a Project

After the project is chosen and approved by the stakeholders, the learners should prepare a plan of work showing how the project is to be carried out, (Kibett, 18th June 2005, personal communication). The plan should include the following aspects such as description of the project, project objectives (what skills, knowledge, and attitudes will be gained), the amount and cost of materials, equipment and facilities required. The plan also shows details of activities to be performed and the order in which they will be performed until the project is completed. Records are kept to show how the project is progressing, methods of evaluation to be used (by learners,

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teachers, parents, and other stakeholders) and at what point in time. The plan acts as a guide on what is to be done.

2.7.2.5 Project Implementation

The student identifies a problem which should be as original as possible. The interest, the cost and availability of equipment and materials needed in the project should be taken into account (Ombati, 16th June, personal communication). A hypothesis has then to be established. The student teachers should then plan further and organize data and study trends. The hypothesis is then tested on the basis of data collection. The results are then presented conclusions, summary and recommendations are given and finally reports are presented (Kibett, 16th July, personal communication)

2.7.2.6 Assessment of ATPPs

All ATPPs should be assessed graded and marks awarded. The criterion for awarding marks should be communicated to the students before the start of the project (Kibett, 2002). Originality and communication should be adequately awarded, (Mwangi, Muguchia and Rutatora, 1996).See appendix E for the marking scheme.

2.7.2.7 Report Writing

Reports are considered to be a control system that assures projects are executed according to the work plan and funds are used in the authorised way (Cropley, 1978). The report also describes the physical progress on project implementation by providing information on activities undertaken and products produced (Brunkechoff, 1983). At the end of the teaching Practice session the student teachers are expected to write a report, which is then marked, and a grade awarded. In preparation of this activity student teachers from Egerton University are taken through a course unit known as Technical Report Writing. It is here they acquire the skills of writing a good project report (Kibett, 16th July, personal communication)

2.8 Project Sustainability

Project sustainability can only be achieved through thorough project evaluations (Daly, 1987). Evaluations of projects have shown that certain factors are very significant for achieving good goal fulfilment of projects (Karlson, 1996). The factors of success for good goal fulfilment most

frequently mentioned in evaluation of projects include the commitment of all parties involved and a feeling of ownership and responsibility, realistic objectives and specific goal fulfilment (Anadajayasekaran, Martella & Rukuni, 1996). Specific links between what is done within the framework of the project activities and what can be achieved, (objectives) is also important (Hart and Maureen, 1999). Capacity to deal with risks and having definite and flexibility to adjust processes if conditions change is required also (Hartfield & Karlen, 2005). Projects, in which the users (beneficiaries), of the service provided by the project have participated in, are sustained in the long run (Anderson, 2004). Project management courses can also be organized for teachers in secondary schools to equip the teachers in managerial skills required in project sustainability (Henry, 2006).Though the TP projects are done on a small scale, it would be interesting to find out whether these factors that affect large-scale projects would have an influence on sustainability of the TP projects.

2.8.1 Measuring Sustainability using Indicators

There are several methods available to develop sustainability indicators and a thorough literature review was conducted to study them. One of the methods developed is largely based upon Mitchell's (1996) work in the United Kingdom. In a broad sense, the community begins with the concept "sustainability", identifies its components parts (issues), selects indicators to accurately reflect the presence or absence of that dimension, and then evaluates the final indicator set. The specific steps of the method are as follows; Establishing principles and definitions, selection of issues, construction of indicators and evaluation.

2.8.2 Principles and Definitions

The first step in the indicator development process involves the identification and definition and principles of sustainability (Conner & Kolodinsky, 2006). The community embarking on this project must identify which definition they are employing and which specific principles they are basing their project on. This step should be done through an extensive public participation process, and review of prior planning documents should elucidate clear principles and definitions for the community. For the purpose of this study, the objectives of initiating the ATPPs in secondary schools will be used to help in indicator development.

2.8.3 Selection of Issues

After a consensus is reached on the principles and definitions of sustainability, the next step is the selection of issues or components of sustainability for the community. There are a number of core issues which "are applicable to any community" like energy consumption and water quality (Mitchell, 1996). But the issues for a community's indicator project must also include important local concerns. This step of the process can best be done through a review of the literature to determine the global issues and matching that against local concerns raised through public participation or prior planning activities it is helpful at this stage to pose the relevant issues as question (i.e. rather than stating that the economy is an issue, it is more useful to ask "is the economy healthy"), indicators/measurement of results, risk analysis and analysis of assumptions. In planning for the TP projects the students are expected to develop project proposals and go by it during the other stages of the project cycle.

2.8.4 Construction of Indicators

After the relevant issues have been identified and put into the form of question, The next step is to provide a scientific way to answer those questions. Indicators may already exist in the literature which can be borrowed or adapted for the purpose of answering an issue – question. For example, to answer the question "is the economy healthy?" one indicator that could be utilised is unemployment rate. According to Mitchell, et al., in the cases of where indicators are not readily available, a new indicator may be constructed. This construction should be done in consultation with those having relevant subject-knowledge (Mitchell, 1995). This view was used to guide on who qualified to construct the indicators of sustainability in this study. Members in AGED department qualified to construct indicators of TP project sustainability, because they have the relevant subject knowledge.

2.8.5 Evaluation of Sustainability Indicators

A critical analysis of evaluation criteria established, reveals great consistency among many approaches. The following nine criteria were used by a group of three teachers in sustainability indicator development, relevance, validity, consistency and reliability, measurability, clarity, comprehensiveness, cost effectiveness and comparability (Maclaren, 1996 and Mitchell, 1955). During this final step, each indicator is tested against the nine criteria. There is no requirement

that each indicator perfectly meets each criterion, this final step is only intended to guide the indicator development process. "Deficiencies in meeting indicator criteria should be recorded and noted alongside the final sustainability indicator, and should be subject to periodic review" (Mitchell, 1995). The indicators in this study were fully developed after data collection so as to incorporate the responses from various respondents, stakeholders in the secondary schools.

2.9 Theoretical Framework

The idea of teaching using projects can be grounded on constructivism which is (Educational Broadcasting Corporation, 2004) basically a theory based on observation and scientific study -- about how people learn. It says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When we encounter something new, we have to reconcile it with our previous ideas and experience, maybe changing what we believe, or maybe discarding the new information as irrelevant. In any case, we are active creators of our own knowledge. To do this, we must ask questions, explore, and assess what we know.

In the classroom, the constructivist view of learning can point towards a number of different teaching practices. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. The teacher has to understand the students' pre-existing conceptions, and guides the activity to address them and then build on them.

2.10 Conceptual Model

This study adopted a conceptual framework whose role was to show the interactions between dependent and independent variables (Anadajayasekaran at el 2002). Selected factors, that is, project factors, school characteristics, head teachers', agriculture teachers' and secondary school students' perceptions towards TP projects formed the independent variables of this study. The dependent variable comprised the level and index of sustainability of ATPPs other factors held constant.

Project factors that were studied included: type of the project, continuity arrangements, made by the student teacher, and planning of the TP projects. School's location, status (provincial, district and private) and type was studied under schools' characteristics. One of the intervening variables of this study was the agro ecological factor. This factor was built in the study by including schools from different ecological zones. Identifying divisions where the schools were located helped to control the few differences that arose due to different ecological conditions. The re was a likelihood of head teacher's and agriculture teacher's characteristics influencing the result of the study to a large extent and therefore these factors were also built into the study. External Institutional support was to be absent in all the schools that participated in the research. Preliminary studies in most schools of Nakuru County have shown that majority of the schools do not receive financial support from other institutions therefore other institutional support factor was considered to be constant in all schools.

ATPPs sustainability formed the dependent variable. The indicators of sustainability included lifespan of the projects, utilization of the project by agriculture teachers and students, utilization of the project by the school community, level of completion of the project and the ratio of existing number of the project versus the number of the projects initiated. Each indicator was given a score and the total score was aggregated and used to develop the overall mean sustainability index. This index was used to give various levels of ATPPs sustainability in different schools. The relationship between independent and dependent variables is shown in Figure 1.

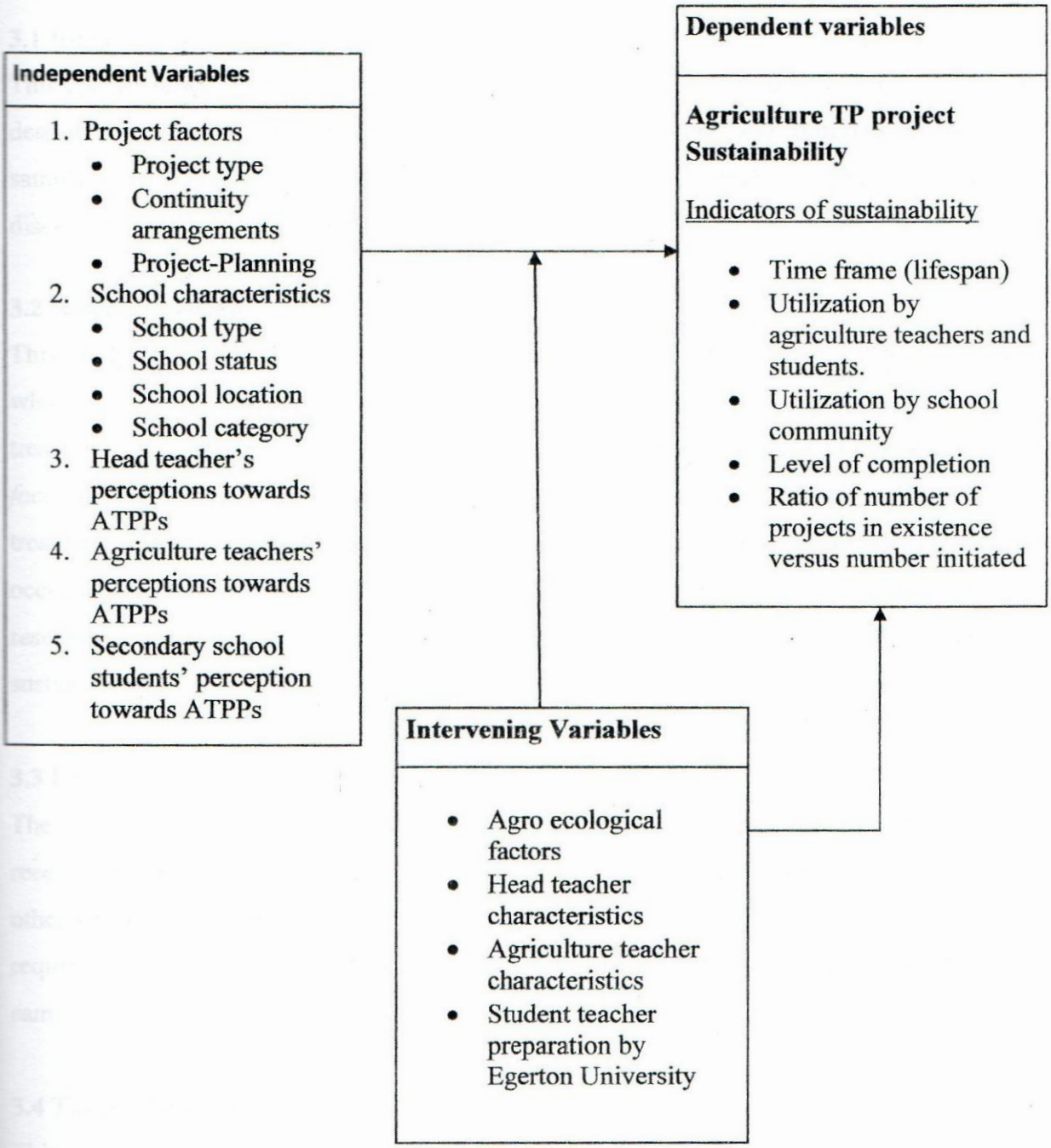


Figure 1: Conceptual framework showing the factors influencing ATPPs sustainability

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology the researcher used in the study. Specifically the chapter describes the research design, location of the study, population and sampling procedures. The sample size, research instruments, data collection and data analysis procedures have also been discussed.

3.2 Research Design

This study used a cross sectional survey research design with an ex-*post-facto* approach, in which the researcher examined retrospectively the effects of a naturalistically occurring treatment on a subsequent outcome (Kathuri & pals; 1993). Tuckman (1978) defines *expost-facto* as a term used to refer to an experiment in which the researcher rather than creating the treatment, examines the effects of a naturalistically occurring treatment after the intervention has occurred. In this study, the ATPPs were already initiated in the secondary schools and the researcher was interested in determining how various selected factors had influenced their sustainability.

3.3 Location of the Study

The study was conducted in secondary schools in Nakuru County because the County had received student teachers over the years owing to its closeness to the university compared to other counties. The schools were selected from rural and urban set ups These schools were required to have received agriculture student teachers in consecutive years from 2001, See the sampling frame in Appendix E.

3.4 Target Population

This study targeted 375 ATPPs that had been initiated between the years 2001 to 2005, assuming at least one project was initiated every year in the 75 secondary schools that had hosted Egerton University Agriculture student teachers. All the 75 head teachers and 75 agriculture teachers in charge of agriculture projects in the schools were targeted in this study. The schools targeted were drawn from provincial, district, and private categories. The study also included schools

locate in urban and rural areas. A consideration was also made to include boarding, day and both day and boarding secondary schools.

3.5 Sampling Procedures and Sample Sizes

The agriculture projects in the schools formed the sampling units of the study. They were selected by proportionate stratified sampling to include the strata shown in Table 1. Projects were sampled from provincial, district and private schools within the county. All the head teachers of the sampled schools were selected. A total of 33 secondary schools were sampled from a sampling frame of 75 schools yielding a total of 33 head teachers, 33 agriculture teachers and 66 TP agriculture projects. From every sampled school an equal sample of 5 students (form 4s or form 3s) was randomly selected. These sample sizes were representative (representing at least 30%) of the respective target populations. For heterogeneous populations, this proportion was adequately representative for surveys according to Mugenda & Mugenda, 1999; Borg & Gall, 2003.

The agriculture teachers were selected purposively to include those in charge of the agriculture projects in their schools. One agriculture teacher from every sampled school was chosen. Simple random sampling technique (simple balloting) was used to select sixty six (66) ATPPs from the two hundred projects that had been initiated in the schools since the year 2001. Two out of the five projects that have been initiated in each school in the years 2001-2005, were selected using simple random sampling. It is assumed that every school in the sampling frame (see appendix E) had at least five projects, initiated by the time specified. The agriculture teacher in charge of the projects in each school provided the list of projects. Use of ballot papers helped to randomly select the two ATTP projects required for the study.

Table 1: Population and samples of headteachers, agriculture teachers and projects

School category	Population			Sample		
	H/teachers	A/Teachers sec	Projects	H/teachers	A/Teachers	Projects
Provincial school	15	15	75	8	8	16
District schools	33	33	165	15	15	30
Private schools	27	27	135	10	10	20
Total	75	75	375	33	33	66

3.6 Instrumentation

Four instruments were used in the study. Two structured questionnaires were prepared, one for the head teacher and the other for the agriculture teacher. The items in the head teachers' questionnaire (Appendix B) helped to achieve the objectives on the schools characteristics, head teacher's perception towards factors related to ATPPs and his/her characteristics. The agriculture teacher questionnaire (Appendix C) helped to collect data on agriculture teachers' characteristics, project factors, perceptions towards ATPPs and observations made over the five years on TP projects concerning continuity arrangements made.

The third instrument was an observation schedule (Appendix A), which was completed by the researcher. This schedule helped to collect information that assisted to determine the sustainability levels and indices of various ATPPs. The data on the projects that was targeted by the observation schedule included, years of project establishment, levels of completion, project continuity level, level of utilization by agriculture teachers and students, level of utilization by the school community and conditions of the project. In addition, the secondary school students' perception towards agriculture projects was elicited using a perception scale (Appendix D)

3.6.1 Validity of Research Instruments

The researcher assessed the validity of the questionnaires and the observation schedule (Fraenkel & Warren, 2000; Mugenda &Mugenda, 1999: Kothari, 1990), defined validity as the degree to which, results obtained from the analysis of the data actually represents the phenomena under study. The experts from Faculty of education, assessed the content, construct and face validity of

the questionnaires and the observation schedule. This was done to ensure it captured meaningful and useful information as intended by the research.

3.6.2 Reliability of Research Instruments

The researcher carried out a pre-test of the questionnaires and the observation schedule in a pilot study carried out in 10 secondary schools in Laikipia county. The county had continuously received agriculture TP teachers from the year 2001 from Egerton University and the agro ecological conditions were almost similar to those of Nakuru County where the actual study was conducted. This made Laikipia to be appropriate location for he pilot study. Cronbach's reliability coefficient was used to test the reliability of the instruments. Two stage pre-test was carried in testing of the reliability. The results of the first test yielded an internal consistency coefficient of 0.67 and 0.58 were obtained for the head-teacher and agriculture questionnaires respectively. These were below the recommended threshold of 0.7 (Fraenkel & Warren 2000). The instruments were adjusted by refinement, adjustment of question number and orders with the help of the supervisors and measurement and evaluation experts to improve their reliability. A second stage reliability test was conducted and the reliability coefficients for the headteacher and the agriculture teacher questionnaires were 0.73 and 0.81 respectively.

3.7 Data Collection Procedures

The researcher obtained a letter from the graduate school of Egerton University to enable her apply for a permit to conduct research. The permit was sort from the Ministry of, Science and Technology. There was an introductory visit to the sampled secondary schools and a courtesy call was paid to the District Education Officer, Nakuru County. Questionnaires in many African countries do not reach those they are sent to if posted by mail (Peil, 1995), to minimise this problem, the researcher hand delivered the questionnaires to the head teachers and agriculture teachers. During the visit to the schools, four students were randomly selected with the help of the agriculture teacher and the perception scale administered. According to Kothari, (1990) observation as a research technique must always be done by an expert and directed for a specific purpose.

3.8 Data Analysis Procedures

Prior to data analysis, the questionnaires were checked for clarity, completeness and consistency in the responses given. According to Koul (1996) hand sorting and organisation of data require careful planning. The data collected from the questionnaires were organized, coded and entered in the computer for analysis using the Statistical Package for Social Sciences (SPSS). Descriptive statistics, namely: means, standard deviations and percentages were used to describe the various objectives. Chi-square, Pearson product moment correlation coefficient moment and ANOVA were also used to test for the hypotheses of the study at 5% significance level.Indicators of sustainability were established using a method which begins with establishing principles and definition, selection of issues, construction of indicators and evaluation.

The procedure described in the literature review which involves establishing principles and definitions, selection of issues, construction of indicators and evaluation were followed during the construction of the indicators of the study. In developing indicators the objectives of the study were considered. The approach discussed puts emphasis on the purpose of the project in development of indicators. The main reason of establishing ATPPs in secondary schools was to provide teaching and learning resources. The level of utilization of the projects by agriculture teachers and the students, the period of time the projects remain in existence after completion, assuming that the longer the period of time the project remains in existence, the higher the utility levels. The level of completion and the ratio of the number of the projects in existence versus number of the projects initiated have also been considered as sustainability indicators.

An observation schedule was used to score various observed characteristics on a scale of five points (See appendix A for the observation schedule). The score were then aggregated and a mean score for the two projects, sampled from every school, was calculated to reflect sustainability levels of ATPPs in the various secondary schools in Nakuru County. The overall project sustainability index (PSI) was calculated based on individual indicators that were assessed with regard to the current state of sustainability. Each of the component indices was computed from responses given or observed. In developing a sustainability index for the

projects, the scores obtained from the observation profoma were compounded as shown in the expression below.

$$PSI = (PLIxPUIxPCIxPe/Pi)^{1/5}$$

Where PSI=project sustainability index

PLI = project lifespan index

PUI=project utilization level by teachers students and school community index

PCl= project completion level

Pe/Pi= ratio of existing number of projects from 2001-2005 vs. number of projects initiated index

The resultant sustainability index was further classified as follows

1.0 – 1.8	-	Very low levels of project sustainability
1.9 – 2.6	-	Low levels of project sustainability
2.7 – 3.4	-	Moderate levels of project sustainability
3.5 – 4.2	-	High levels of project sustainability
4.3 - 5.0	-	Very high levels of project sustainability

The influence of project characteristics on the sustainability of agriculture projects was analyzed from the data collected in the observation schedule. These were observations made by the agriculture teachers over the years particularly on the continuity arrangements made by the schools in the running of the TP projects. Chi square and ANOVA were used to test the significance of this data at 5% level of significance. The third objective, which is the influence of the school characteristics on sustainability of TP projects, was achieved by analysis of the data provided by the Head Teachers on school characteristics. The statistical tests used here included both chi-square and ANOVA tests.

Head teacher, agriculture teachers' and secondary school students' perceptions towards ATPPs was also established. The relationship of these perceptions and the sustainability of the projects were determined after data collection. Pearson product moment correlation coefficient (PPMCC) was used as a test of significance in establishing this relationship. The summary of data analysis procedures by objectives is shown in table 2 below.

Table 2: Summary of Data Analysis Procedures

Hypotheses		Independent variables	Dependent variables	Statistical test	Post Hoc
H_{o1}:	There is a low sustainability level of ATTPs initiated by Egerton University student teachers in secondary schools in Nakuru County				
H_{o2}:	There is no statistically significant influence of project factors on sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County	Project factors	ATPPs sustainability Index	Chi-square	Post Hoc
H_{o3}:	There is no statistically significant influence of school characteristics on sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County	Schools' characteristics	ATPPs sustainability Index	Chi-square	Post Hoc
H_{o4}:	There is no significant relationship between headteachers' perceptions towards ATPPs and the level of sustainability of the ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.	Headteachers' perceptions towards ATPPs	ATPPs sustainability Index	PPMCC Pearson Product Moment Correlation Coefficient	Post Hoc
H_{o5}:	There is no significant relationship between agriculture teachers' perceptions towards ATPPs and the level of sustainability of the projects initiated by Egerton university student teachers in secondary schools in Nakuru County	Agriculture teachers perceptions towards ATPPs	ATPPs sustainability Index	PPMCC Pearson Product Moment Correlation Coefficient	Post Hoc

H_{o6}:	There is no significant relationship between secondary school students' perception towards ATPPs and the sustainability of the projects initiated by Egerton university student teachers in secondary schools in Nakuru County	Secondary schools students' perceptions towards ATPPs	ATPPs sustainability Index	PPMCC Pearson Product Moment Correlation Coefficient	Post Hoc

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

Selected factors influencing sustainability of agriculture teaching practice projects initiated by Egerton University student teachers in Nakuru County secondary schools were investigated in this study. These factors included: project factors, school characteristics, perceptions of headteachers, agriculture teachers and secondary school students, towards ATPPs. These factors formed the independent variables of the study. The research also aimed at establishing an index known as sustainability index for the projects and this formed the dependent variable of the study.

The following were the specific objectives of the study.

i) To determine the sustainability index of ATPP initiated by Egerton University student teachers in secondary schools in Nakuru County.

ii) To determine the influence of project factors on sustainability of ATPPs initiated by Egerton University student teachers in secondary schools in Nakuru County.

iii) To determine the influence of school characteristics on the sustainability of ATPPs initiated by Egerton University student teachers in secondary schools in Nakuru County.

iv) To determine the relationship between headteachers perception towards ATPPs and the level of sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

v) To determine the relationship between agriculture teachers' perception towards ATPPs and the level of sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

vi) To determine the relationship between secondary school students' perception towards ATPPs and the level of sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

This chapter presents the results of the data analysis followed by a discussion of the results. For ease of understanding, the results have been presented following the order in which the objectives were stated but first a brief exploratory analysis of subject characteristics has been given.

4.2 Subjects Characteristics

Data for this study was collected through a series of observations and responses to questionnaires by headteachers, agriculture teachers and secondary school students. The subjects of the study included: ATPPs, cooperating schools, headteachers, agriculture teachers and secondary school students.

4.2.1 Characteristics of ATPPS

This study focused on ATPPs initiated over the years 2001-2005.The indicators of sustainability were developed to include: project utilization, project lifespan, project completion and ratio of projects still in existence (Pe*)* compared to those initiated *(Pi)* over the five years. These indicators were measured as levels of sustainability in a continuum scale of 1 to 5 and later classified as very low, low, moderate high and very high levels using the same classification described in chapter three. Table three shows a frequency distribution of the sustainability levels. 80%of the projects had a Pe/Pi level in the range of very low and moderate.

The level of utilization by the teachers, students and the community was very low (30%) in some schools but very high (31%) in other schools. The number of years the project existed after initiation was also low. About 82% of the projects initiated, had either very low or low level of lifespan. About 75% of the projects had a high or very high completion level. Overall the results showed that majority of the projects (88%) had sustainability levels ranging from very low to moderate.

Table 3: Frequency Distribution of the Sustainability Indicator Levels

Sustainability indicator	level	frequency	percent
Ratio of projects initiated vs. Projects initiated level*(Pe/Pi)*	Very Low	19	28.8
	Low	20	30.3
	Moderate	20	30.3
	High	7	10.6
	N	66	100
Project utilization level	Very Low	20	30.3
	Low	8	12.1
	Moderate	8	12.1
	High	9	13.6
	Very high	21	31.8
	N	66	100
Project lifespan level	Very Low	11	16.7
	Low	54	81.8
	Moderate	1	1.5
	High	0	0.0
	N	66	100
Project completion level	Low	2	3.0
	Moderate	13	19.7
	High	8	12.1
	Very high	43	65.2
	N	66	100
Overall level	**Very Low**	**8**	**12.1**
	Low	**25**	**37.9**
	Moderate	**18**	**27.3**
	High	**15**	**22.7**

4.2.2 Characteristics of project factors

The project characteristics that were investigated in this study were: year when the project was initiated, involvement of the stakeholders in planning and implementation of the projects, project organization, level of project attractiveness, level of complexity of husbandry techniques, level of inclusion of high valued crop or animals, level of student involvement in decision making (transportation and marketing of projects' produce), type of the project, continuity arrangements made by the student –teachers from Egerton university and care of the projects during long vacations.

4.2.2.1 Percentage distribution ATPPs according to year of initiation.

The agriculture teachers in charge of the ATPPs in secondary schools were asked to indicate when the sampled projects were initiated and the results are displayed in figure 2. A higher (26%) number of the projects were initiated in 2004. Projects initiated in the year 2001 were only a mere 7%. This may be attributed to the fact that the projects had been in existence for the longest time compared to others.

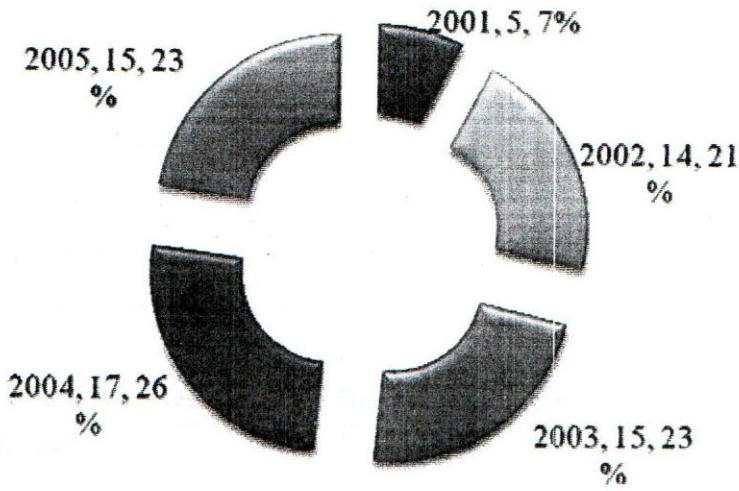


Figure 2: Distribution of TP projects by age – year of initiation

4.2.2.2 Types of projects

Different types of projects were initiated in cooperating secondary schools. Table 4 shows the type of the ATPPs that were studied. Majority (71%) of the students initiated either livestock or farm structures projects. There were very few (3%) soil and water conservation projects. The findings also revealed that agroforestry projects initiated were also very few (6%). This is in comparison to livestock and farm structure projects.

Table 4: Frequency distribution of Types of Agriculture Teaching Practice Projects (ATPPs)

Type of project	Frequency	Percentage (%)
Livestock	20	30.3
Farm structures	27	40.9
Crop production	6	0.9
Teaching aids	9	13.6
agroforestry	1	1.5
Soil and water conservation	3	4.5
Total	**66**	**100.0**

Other project factors that were investigated included: involvement of the stakeholders, project organization, level of project attractiveness, level of complexity of husbandry techniques of projects, level of inclusion of high valued crop or animals, level of student involvement in decision making (in transporting and marketing produce from the projects) see table 5.

Table 5: Frequency Distribution for Project Factors

Project factor		Frequency		Total
Involvement of stakeholders in decision making		Involved	Not involved	
		20	46	66
	%count	30	70	
Project organization		Organized	Not organized	
		28	38	66
	%count	42	58	
Project attractiveness		Attractive	Not attractive	
		25	41	66
	%count	38	62	
Level of complexity of husbandry techniques		Simple	Complex	
		18	48	
	%count	12	78	66
Inclusion of high valued crop or livestock		Included	Not included	
		34	32	66
	% count	27	63	

4.2.2.3. Characteristics of cooperating secondary schools

Schools were sampled from provincial, district and private schools out of which 47% of the schools were categorized as district and rural schools while 33% and 20% were in the category of provincial/ rural and private/rural schools respectively. Majority (53%) of the schools in the county were day/rural schools. The percentage of those that were both day and boarding/rural was only 7%. Urban/ provincial and urban/rural schools used in this study were equal in number (43%). Among the schools used in this study, 56% were urban /day schools. Table 6 shows the frequency distribution of the secondary schools.

Table 6: Frequency distribution of the schools according to location, status and school type

	Rural	Percent (%)	Urban	Percent (%)	Total
School provincial					
District	6	33	2	14	8
Private	9	47	6	43	15
Total	4	20	6	43	10
	19	100	14	100	33
School type					
Day	8	53	10	56	18
Boarding	6	40	6	33	12
Day and boarding	1	7	2	11	3
Total	**15**	**100**	**18**	**100**	**33**

4.2.2.4 Characteristics of head-teachers and Agriculture teachers

A total of 33 Headteachers and agriculture teachers were studied. Formal education level, subject specialization, experience and gender, attribute of the headteachers and the agriculture teachers have been presented in a series of illustrations in tables 7, 8, and 9.

Table 7: Frequency Distribution of Head Teachers and agriculture Teachers according to their level of formal education

Level of education	Headteachers		Agriculture teachers	
	Frequency	Percent	Frequency	Percent
Diploma	2	6.1	10	30.3
Bachelors degree	24	72.1	21	63.6
Master degree	6	18.2	2	6.1
PHD	1	3	0	0.0
Total	**33**	**100**	**33**	**100**

The highest level of formal education for the headteachers was a bachelor's degree (72.1%) the same trend was observed among the agriculture teachers with percentage of 63.3%. Majority of the headteachers' level of formal education was a bachelor's degree. Only 3% of the headteachers had a doctorate degree.

Table 8: Frequency Distribution of the Headteachers and Agriculture Teachers According to Gender

Gender	Headteachers		Agriculture teachers	
	Frequency	Percent	Frequency	Percent
Males	22	66.7	19	57.6
Females	11	33.3	14	42.4
Total	**33**	**100.0**	**33**	**100.0**

Most of headteachers were males (66.7%). Among the agriculture teachers, 57.6 % were males and 42.2% were females.

Table 9: Frequency Distribution of the Headteachers According to their Area of Specialization

Area of specialization	Headteachers	
	Frequency	Percent
Languages	13	39.4
Humanities	18	54.5
Sciences	2	6.1
Technical subjects	0	0.0
Total	**33**	**100.0**

Majority of the headteachers (93.9%) had been trained to teach either Humanities or languages. Among the headteachers, no one had trained to teach technical subjects. Agriculture was classified under technical subjects at the time the research was carried out and it means therefore there was no head teacher with an agricultural academic background.

4.2.2.5 Characteristics of secondary school students

Majority of the students (67%) who participated in this study were males. Most of the students were drawn from either form three or four. 90% of the students said they were happy to be involved in the management of the ATPPs.

4.3 Testing of Hypotheses

The results of hypotheses tested have been presented in the section that follows. The objectives of the study have been stated first followed by a description of methods that were followed to answer either a research question or test the hypotheses. This is followed by a discussion of the findings of the analyzed results.

4.3.1 Objective One: To determine the sustainability level of ATPP initiated by Egerton University student teachers in Nakuru County secondary schools.

The data that aided to determine the level of project sustainability were collected using the observation profoma/ schedule shown in appendix A. The profoma was completed by the researcher after careful observation of the projects in the secondary schools. The results showed that the level of sustainability of the ATPPs initiated by Egerton University student teachers in secondary schools in Nakururu County is 2.7 which can be classified as moderate.

H_{o1}: *There is a low sustainability level of ATPPs initiated by Egerton University student teachers in secondary schools in Nakuru County.*

4.3.2 Research Question: How Sustainable are the ATPPs initiated in secondary schools in Nakuru County by Egerton University student teachers?

To determine the level of sustainability of ATPPs initiated by Egerton university student teachers in Nakuru county secondary schools, the mean values for project sustainability indicators including ratio of existing projects (Pe/Pi) vs. those initiated, project utilization, project lifespan, and project completion were compounded and computed as described in chapter three. Projects

were then categorized as having very low sustainability index, low, moderate, high and very high levels of project sustainability. The mean of means from the indicator indices was obtained. This was found to be 2.694 (≅ 2.7), the mode, 4.17 the minimum was 1.22 and the maximum 5. Table 10, shows the descriptive statistics of Pe/Pi) indicator index, project utilization index, project lifespan index, project completion index and the overall sustainability index.

Table 10: Descriptive Statistics of Project Sustainability Indicators and Overall Index

	N	Min	Max	Mean	Std. Deviation	Std. Error
Project management index	66	1.00	3.89	2.4057	.0981	.79683
Project utilization index	66	1.00	5.00	3.0909	.1934	1.57116
Project lifespan index	66	1.00	3.00	1.8485	.0494	.40163
Project completion index	66	2.00	5.00	4.3939	.1119	.90942
Project sustainability index	**66**	**1.49**	**3.73**	**2.6938**	**.0863**	**.70094**

The mean of 2.7 corresponds to moderate level of sustainability according to the categorization of levels described in chapter three. Further observation of the individual components of the sustainability index shows that Project lifespan index had the least score with a mean of only 1.8 while Project completion index had the highest mean of 4.4. The high completion index was expected because majority of the projects initiated in the county were completed before student teachers from Egerton University left the TP schools. This is possibly because marks were awarded for completion of the projects by University supervisors. The low lifespan index may give clues of what happened after the departure of the student teachers. Majority of the projects may have collapsed.

This result of moderate sustainability level slightly deviates from previous study findings which indicated that science TP projects in secondary schools were durable and easily sustained (Ndirangu, 2000). The deviation may be attributed to the differences in the type of projects between science and agriculture projects. Most science projects, according to Ndiragu (2000), were teaching aids which are mainly kept in the laboratories away from effects of the environment. Agriculture projects on the other hand were started in the school farm where they

were exposed to extreme weather conditions and this may have affected their sustainability. Some of the agriculture projects involve keeping of livestock and growing of crops. These are living entities and they have continuous requirements that would affect their sustainability (Sheffield, 1975). This may explain the fact that whereas science TP projects were easily sustained, agriculture TP projects sustainability was not achieved easily. Those agriculture projects that were in the category of teaching aids were more in number than any other category. In other words more agriculture projects in the category of teaching aids had been sustained. In this regard there was an agreement with the study conducted by Ndirangu (2002).

4.3.4 Objective two: To determine the influence of project factors on sustainability of ATPP initiated by Egerton University student teachers.

The data for this objective was collected from the headteacher and agriculture teacher questionnaires shown in appendix B and C. Each of the questionnaires had a section on the projects.

4.3.5 Hypothesis one:

H_{o2}: *There is no statistically significant influence of project factors on sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.*

To determine the influence of project factors on the sustainability of ATPPs initiated by Egerton University student-teachers in Nakuru County secondary schools, Chi-square was used. Selected project factors included: type of the project, continuity arrangements made before departure of the student teacher, care of the projects during vacations, level of project organization, level of project attractiveness, level of complexity of husbandry techniques, level of inclusion of high valued crop, fraction of returns given to those who worked on the project, level of students involvement in decision making, level of student involvement in marketing of produce, and level of student involvement in the transportation of the produce. A significant ($p \leq 0.05$) positive relationship was obtained which showed that these are important factors to consider while initiating the ATPPs in secondary school. This agreed with previous studies (Sheified, 1976) which outlined the above project factors as important pointers to successful agriculture projects

Table 11: Pearson Product Moment Correlation Coefficients between Selected Project Factors and Sustainability

Project factors		Project Sustainability Index
Level of stakeholders involvement in planning and implementation	Pearson Correlation	.783(**)
	Sig. (2-tailed)	.000
	N	66
Level of project organization	Pearson Correlation	.934(**)
	Sig. (2-tailed)	.000
	N	66
Level of project attractiveness	Pearson Correlation	.440(**)
	Sig. (2-tailed)	.000
	N	66
Level of complexity of husbandry Techniques	Pearson Correlation	.539(**)
	Sig. (2-tailed)	.000
	N	66
Level inclusion of a high valued crop or livestock	Pearson Correlation	.673(**)
	Sig. (2-tailed)	.000
	N	66
Level of students involvement in decision making (transportation & marketing)	Pearson Correlation	.679 (**)
	Sig. (2-tailed)	.000
	N	66
Level of returns to those who took care of projects	Pearson Correlation	.768(**)
	Sig. (2-tailed)	.000
	N	66

Descriptive statistics in three of the project factors have been presented in tables 12, 13and 14. These are influence of type of project on sustainability levels, influence of continuity arrangement and the influence of care accorded to projects during vacations on sustainability levels of the projects.

4.3.5.1 Influence of type of project on project Sustainability

Projects initiated in various schools were of different in types. Some were livestock projects while the others were farm structures, crop production, teaching aids, Agroforestry and soil and water conservation projects. Table 12 shows a cross-tabulation of the frequencies of projects according to their type and level of sustainability.

Table 12: Cross Tabulation between Project Type and Sustainability of the ATPPs

Type of Project	Parameter	Sustainability index		Total
		Not Sustainable	Sustainable	
Livestock	Count	6	14	20
	% of Total	9.2%	21.1%	30.3%
Farm Structures	Count	13	14	27
	% of Total	19.7%	21.1%	40.8%
Crop Production	Count	5	1	6
	% of Total	7.9%	1.3%	9.2%
Teaching Aid	Count	5	4	9
	% of Total	6.6%	6.6%	13.2%
Agroforestry	Count	0	1	1
	% of Total	.0%	2.6%	2.6%
Soil and water conservation	Count	0	3	3
	% of Total	.0%	3.9%	3.9%
Total	Count	29	37	66
	% of Total	43.4%	56.6%	100.0%

Statistics: Chi-square 11.000, $p \leq .051$, df 5, n=66

The results showed that the type of project influences its sustainability. The cross tabulation between project type and sustainability of the ATPPs revealed that the differences in the percentages of projects that were sustained are significant ($p \leq 0.051$). Complex and risky projects that depended on environmental factors (especially crop-related projects), were less sustainable as compared to those that were perceived to be simple and less dependent on uncertain environmental conditions. It is interesting to note that majority of the students did not chose soil and water conservation projects yet this would have been useful in providing water to all other projects hence improving the sustainability levels.

4.3.5.2 Influence of continuity arrangement of project on project sustainability

All schools had some sort of continuity arrangement. The arrangements varied from involvement of students, agriculture teacher, head agriculture subject, head teacher to no arrangement at all. Though majority of the schools used either agricultural teacher or the head of agricultural subject to manage the continuity of the projects, this has no influence whatsoever on the sustainability of the projects. Table 13 shows the results of a bivariate correlation between sustainability of the projects and the continuity arrangements available in schools.

Table 13: Bivariate Correlation Coefficients between type of Continuity Arrangement and Project Sustainability

Continuity arrangement	r	p
Students	.137	ns
Agriculture teacher	.085	ns
Head Agriculture subject	-.017	ns
Head teacher	.043	ns
Schools without arrangement	-	ns

n=66; ns = non-significant at $p \leq .05$

Continuity arrangement showed that though majority of the schools used either the agriculture teacher or the head of agriculture subject to manage the continuity of the projects, there was no sufficient evidence to show that this had an influence on the sustainability levels of the projects. Care of ATPPs during the long vocation on the sustainability of the ATPPs was also investigated and the results showed that the care of the projects during long vacation had a significant influence on the sustainability of the ATPPs. Significant correlation ($r=.244$, $p\leq.05$) was found between sustainability of the project and the care of the project by school workers. Significant correlation ($r=.260$, $p\leq.05$) was also found between sustainability of the projects and the care of the projects by the headteacher.Other factors that constituted the project management with significant contribution to project sustainability were: project planning, involvement of stakeholders in planning and involvement of agricultural teacher during the planning stage of the ATPPs. This agreed with Sida (2004) who noted that involvement of project stakeholders in

planning and implementation stages creates a sense of ownership of the projects which ultimately ensured the continuity of the projects long after the departure of the external supports.

4.4 Objective 3: To determine the influence of school characteristics on the sustainability of ATPP initiated by Egerton University student teachers in Nakuru County secondary schools.

The data for this objective was collected from three instruments, the observation profoma, headteacher questionnaire and the agriculture teacher questionnaire. Descriptions of the schools' characteristics have been given first and the testing of the hypothesis and a discussion of the findings follows.

4.4.1 Hypothesis Two

H_{o3}: *There is no statistically significant influence of school characteristics on sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.*

The study investigated the influence of a number of factors considered in the conceptual framework as moderator variables including school location, school category and school status in order to establish their possible influence on the project sustainability. Tables 9 and 10 present the descriptive statistics of various project sustainability indices according to these three moderator variables while Tables 14, 15, 16, 17 and 18 present cross-tabulation of the various project sustainability classes according to the school status. The influence of these factors was tested using independent sample t-test, one-way ANOVA and χ^2 statistic. Based on an independent sample t-test, there was no significant difference in the sustainability indices according to the school location. The respective t-test results were:

Table 14: Descriptive Statistics

	df	t	P- value
Project Pe/Pi index N=66	64	0.361	0.719
Project utilization index N=66	64	0.278	0.729
Project lifespan index N=66	64	0.278	0.782
Project sustainability index N=66	**64**	**0.240**	**0.811**

Project management index (t=0.361, df=64, p=0.719); project utilization index (t=0.348, df=64, p=0.729); project lifespan index (t=0.278, df=64, p=0.782); project completion index (t=0.221, df=64, p=0.826); and project sustainability index (t=0.240, df=64, p=0.811). The location of the school does not influence sustainability as the choice of the projects depend on factors that take into account availability of resources and space as dictated by whether a school is in the rural or urban areas.

Table 15: Descriptive Statistics of ATP Project Sustainability Indices according to School Location

Sustainability Index	School Location	Mean	Std. Deviation	Std. Error Mean
Project Pe/Pi index	Rural	2.4383	.80560	.13427
	Urban	2.3667	.79812	.14572
Project utilization index	Rural	3.1528	1.66827	.27805
	Urban	3.0167	1.47089	.26855
Project lifespan index	Rural	1.8611	.35074	.05846
	Urban	1.8333	.46113	.08419
Project completion index	Rural	4.4167	.87423	.14571
	Urban	4.3667	.96431	.17606
Project sustainability index	**Rural**	**2.7129**	**.70125**	**.11688**
	Urban	**2.6710**	**.71185**	**.12996**

It was noted that schools located in rural areas had higher ($p<0.5$) percentage of projects with higher sustainability. This may be attributed could have been attributed to cheaper labour, availability of supervisors or keen students. The students from rural schools came from farming communities and this contributed to the higher sustainability levels of the ATPPs in Nakuru County secondary school. The influence of the school category on the sustainability of the projects was tested using one-way ANOVA with the assumption that any significant differences between the indices according to school category would indicate a significant influence of this moderator variable. The study found no evidence (at $p \leq 0.05$) to support a significant difference in the sustainability indicators between schools of various categories. It therefore does not matter

whether a school is provincial, district or private. Table 16 presents a summary of the One-Way ANOVA test.

Table 16: Descriptive Statistics of ATP Project Sustainability Indices According to School Category

Sustainability Index		N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Min	Max
Project Pe/Pi index	P	22	2.44	0.67	0.14	2.15	2.74	1.22	3.56
	D	36	2.41	0.92	0.15	2.10	2.72	1.00	3.89
	Pr	8	2.29	0.57	0.20	1.81	2.77	1.44	3.00
	T	66	2.41	0.79	0.10	2.21	2.60	1.00	3.89
Project utilization index	P	22	3.36	1.64	0.35	2.64	4.09	1.00	5.00
	D	36	2.85	1.53	0.25	2.33	3.36	1.00	5.00
	Pr	8	3.44	1.59	0.56	2.11	4.77	1.00	5.00
	T	66	3.09	1.57	0.19	2.70	3.48	1.00	5.00
Project lifespan index	P	22	1.95	0.21	0.05	1.86	2.05	1.00	2.00
	D	36	1.81	0.47	0.08	1.65	1.96	1.00	3.00
	Pr	8	1.75	0.46	0.16	1.36	2.14	1.00	2.00
	T	66	1.85	0.40	0.05	1.75	1.95	1.00	3.00
Project completion index	P	22	4.68	0.78	0.17	4.34	5.03	2.00	5.00
	D	36	4.33	0.96	0.16	4.01	4.66	2.00	5.00
	Pr	8	3.88	0.83	0.30	3.18	4.57	3.00	5.00
	T	66	4.39	0.91	0.11	4.17	4.62	2.00	5.00
Project sustainability index	**P**	**22**	**2.87**	**0.67**	**0.14**	**2.57**	**3.16**	**1.49**	**3.65**
	D	**36**	**2.60**	**0.72**	**0.12**	**2.36**	**2.84**	**1.72**	**3.73**
	Pr	**8**	**2.65**	**0.71**	**0.25**	**2.05**	**3.24**	**1.63**	**3.43**
	T	**66**	**2.69**	**0.70**	**0.09**	**2.52**	**2.87**	**1.49**	**3.73**

Key: P – Provincial; D – District; Pr – Private; T - Total

This finding shows that other factors other than the school category may have contributed to the project's sustainability. It was noted that the private schools were reluctant to offer information about their projects may be for fear of being evaluated.

Table 17: Summary Results of One-way ANONA test of Significant Differences in the Various Project Sustainability Indices by School Category

Sustainability Index		Sum of Squares	df	Mean Square	F	Sig.
Project Pe/Pi index	Between Groups	.137	2	.069	.105	.900
	Within Groups	41.134	63	.653		
	Total	41.271	65			
Project utilization index	Between Groups	4.735	2	2.368	.958	.389
	Within Groups	155.719	63	2.472		
	Total	160.455	65			
Project lifespan index	Between Groups	.391	2	.196	1.222	.302
	Within Groups	10.093	63	.160		
	Total	10.485	65			
Project completion index	Between Groups	4.110	2	2.055	2.608	.082
	Within Groups	49.648	63	.788		
	Total	53.758	65			
Project sustainability index	**Between Groups**	**.993**	**2**	**.497**	**1.011**	**.370**
	Within Groups	**30.942**	**63**	**.491**		
	Total	**31.935**	**65**			

The figures in Table 17 show that there was no evidence of significant variation among the sustainability indicator indices as far as school categories were concerned. Project management index, project utilization index, project lifespan index and project completion index were not significantly different. These results were expected because sustainability of the projects depended mostly on the project factors as shown in objective two. Sustainability was not dependent on whether the schools were in the district, provincial or private category.

Table 18: Cross-tabulation of ATP Project Management Classes according to School Status

		School status			
Project Pe/Pi level		**Day**	**Boarding**	**Day and Boarding**	**Total**
Very Low	Count	12	5	2	19
	%	63.2%	26.3%	10.5%	100.0%
Low	Count	10	8	2	20
	%	50.0%	40.0%	10.0%	100.0%
Moderate	Count	9	9	2	20
	%	45.0%	45.0%	10.0%	100.0%
High	Count	5	2	0	7
	%	71.4%	28.6%	.0%	100.0%
Total	**Count**	**36**	**24**	**6**	**66**
	%	**54.5%**	**36.4%**	**9.1%**	**100.0%**

Pearson Chi-Square = 4.105; df = 3, p-value = 0.250

Based on Pearson χ^2 test, project management is not dependent on school status. Whether a school is of day, boarding or day and boarding did not influence the level of project management. This result was unexpected because we would expect project management level to be higher in boarding schools since students could still take care of projects during holidays and weekends. See Table 18.

Table 19: Cross-tabulation of ATP project Utilization Classes according to School Status

		School status			
Project Utilization Class		**Day**	**Boarding**	**Day and Boarding**	**Total**
Very Low	Count	11	7	2	20
	%	55.0%	35.0%	10.0%	100.0%
Low	Count	4	4	0	8
	%	50.0%	50.0%	.0%	100.0%
Moderate	Count	4	1	3	8
	%	50.0%	12.5%	37.5%	100.0%
High	Count	4	4	1	9
	%	44.4%	44.4%	11.1%	100.0%
Very High	Count	13	8	0	21
	%	61.9%	38.1%	.0%	100.0%
Total	Count	36	24	6	66
	%	54.5%	36.4%	9.1%	100.0%

Pearson Chi-Square = 4.09; df = 3, p-value = 0.394

Based on Pearson χ^2 test, project utilization was not dependent on school status Whether a school is of day, boarding or both day and boarding does not influence the level of project utilization by students, agriculture teachers and the surrounding community. This result was expected because ordinarily it was expected that all learners would utilize the projects initiated in their schools irrespective of whether they were in day or boarding or even both day and boarding schools. See Table 19.

Table 20: Cross-tabulation of ATP Project Lifespan Classes according to School Status

		School status			
Project Lifespan Class		**Day**	**Boarding**	**Day and Boarding**	**Total**
Very Low	Count	4	4	3	11
	%	36.4%	36.4%	27.3%	100.0%
Low	Count	31	20	3	54
	%	57.4%	37.0%	5.6%	100.0%
Moderate	Count	1	0	0	1
	%	100.0%	.0%	.0%	100.0%
Total	Count	36	24	6	66
	%	54.5%	36.4%	9.1%	100.0%

Pearson Chi-Square = 1.745; df = 2, p-value = 0.418

Based on Pearson χ^2 test, project lifespan was not dependent on school status. The lifespan of a project was not dependent on the whether a school is of day, boarding or day and boarding. This result was expected in the sense that the lifespan of a project depends on other factors other than whether the school was day, boarding or both. As indicated in the findings reported in objective two, project factors were the real determinants of project sustainability. See Table 20.

Table 21: Cross-tabulation of ATP Project Completion Classes according to School Status

Project Completion Class		School status			
		Day	Boarding	Day and Boarding	Total
Low	Count	2	0	0	2
	%	100.0%	.0%	.0%	100.0%
Moderate	Count	8	1	4	13
	%	61.5%	7.7%	30.8%	100.0%
High	Count	2	5	1	8
	%	25.0%	62.5%	12.5%	100.0%
Very High	Count	24	18	1	43
	%	55.8%	41.9%	2.3%	100.0%
Total	Count	36	24	6	66
	%	54.5%	36.4%	9.1%	100.0%

Pearson Chi-Square = 1.755; df = 3, p-value = 0.625

Based on Pearson χ^2 test, project completion is not dependent on school type. The extent to which projects are completed by the time a student teacher left the school was not dependent on whether a school was of day, boarding or both day and boarding. This was supported by the findings shown in objective one that the completion of the projects depended on the efforts of the student teachers from Egerton University. The fact that these projects were awarded marks at the end of TP made the student teachers do whatever was within their abilities to complete the ATPPs. See Table 21.

Table 22: Cross-tabulation of ATP Project Sustainability Classes according to School Status

Project Sustainability Class		School status			
		Day	Boarding	Day and Boarding	Total
Very Low	Count	4	2	2	8
	%	50.0%	25.0%	25.0%	100.0%
Low	Count	15	7	3	25
	%	60.0%	28.0%	12.0%	100.0%
Moderate	Count	6	11	1	18
	%	33.3%	61.1%	5.6%	100.0%
High	Count	11	4	0	15
	%	73.3%	26.7%	.0%	100.0%
Total	Count	36	24	6	66
	%	54.5%	36.4%	9.1%	100.0%

Pearson Chi-Square = 0.418; df = 3, p-value = 0.936

Based on Pearson χ^2 test, the overall sustainability of TP projects was not dependent on school status. Whether a school is of day, boarding or day and boarding did not influence the overall sustainability. Other project factors not related to school status were influenced project sustainability.

It was expected that boarding schools would have significantly ($p<.05$) higher percent of sustainable ATPPs. It would be assumed that there were inherent factors associated with boarding schools that favour the sustainability of ATPPs. In boarding schools for instance students would be expected to be available during the weekends to care for the projects. It would also be assumed that the good team work found in boarding schools would contribute to high project sustainability levels, but this was not the case, other factors influenced the sustainability of ATPPs in schools. See Table 22.

4.5 Objective 4: To determine the relationship between headteachers perceptions towards ATPPs and the sustainability levels of ATPPs initiated by Egerton university student teachers in Nakuru County secondary schools.

4.5.1 Hypothesis 4

H_{o4}: *There is no statistically significant relationship between headteachers' perception towards ATPPs and the level of sustainability of the ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.*

To determine the relationship between the headteachers' perception towards ATPPs and the sustainability of the projects initiated by Egerton University student teachers in Nakuru County secondary schools, Data collected using headteachers questionnaire were used.The headteachers' perceptions were captured from the mean responses to the perception scale in Section C of the head teacher questionnaire in Appendix B. The perception index ranged from 1 to 5 and was classified as either positive or negative. Majority of the headteachers (90.9%) had a positive attitude toward agriculture TP projects initiated by Egerton University students. Majority of the respondents (headteachers) identified availability of finances, type of project, availability of water and having a permanent responsible worker as main factors influencing the sustainability of ATPPs in Nakuru County secondary schools. Giving incentives to agricultural teachers, relationship between the headteacher and the agricultural teachers and techniques required by the projects were only perceived as including factors by a few of the respondents. Based on correlation coefficient, the relationship between the headteachers' perception towards TP projects and project sustainability was tested. Table 23 presents the findings including those of the relationship between the agriculture teachers' perception and project sustainability. This has been discussed in the section that follows.

Table 23: Pearson's Product Moment Correlation Coefficients between Headteacher and Agriculture Teacher Perceptions and Sustainability of TP Projects

		PMI	PUI	PLI	PCI	PSI
Head teacher mean perception	Pearson Correlation	-0.25(*)	-0.14	-0.15	-0.01	-0.23
	Sig. (2-tailed)	.039	.252	.233	.404	.065
	N	66	66	66	66	66
Agriculture teacher mean perception	Pearson Correlation	0.16	0.03	0.01	-0.23	0.03
	Sig. (2-tailed)	0.19	0.83	0.96	0.064	0.8
	N	66	66	66	66	66

The study found various levels of both positive and negative relationship between the headteachers' perception towards agriculture TP projects initiated by Egerton University students and their sustainability. Only project management is significantly related to the headteachers' perception towards the projects. Figure 3 illustrated the relative perceptions scores obtained from headteacher responses.

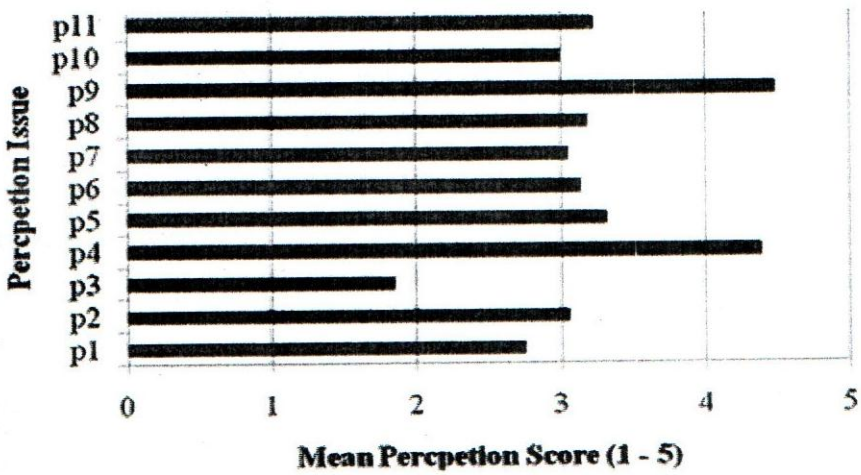


Figure 3: Relative scores of headteachers' perception towards projects initiated by Egerton University students on TP in Nakuru County

Key to Perception Issues:

- p1 Having a permanent responsible farm worker in charge of agriculture projects
- p2 Giving agriculture teachers incentives to boost their morale in sustaining the projects
- p3 The type of the project (whether livestock or crop

p4 The citing of the project
p5 Relationship between the agriculture teacher and the headteacher
p6 Availability of finances for the maintenance of the projects
p7 Availability of water for the projects
p8 Availability of labour especially during the vacations
p9 Availability of time for the sustenance of the projects
p10 Crop and animal husbandry techniques required for the various ATPPs
p11 Overall Agriculture teacher Perception

There was no sufficient evidence to show that significant relationship existed between headteachers' perceptions towards ATPPs and sustainability of ATPPs initiated by student – teachers in Nakuru County secondary schools. Majority of the headteachers responses identified the availability of finances, type of projects, availability of water and having a permanent responsible worker as the main factors influencing the sustainability of ATPPs in Nakuru County secondary schools.

The headteacher was directly involved in financing of the projects in schools. This may have been be a contributing factor to the sustainability of the projects. Most of the headteachers felt that the type of projects had an influence on sustainability. Other perceptions that the headteachers felt had an influence on the sustainability of the projects were: availability of water and having a permanent responsible worker. These results agreed with Sheffield, 1976 who noted that there was a need to leave the agriculture projects under the care of a responsible worker during the long vacation.

Most of the headteachers felt that giving incentives to Agricultural teachers did not influence sustainability of the ATPPs. This contradicts the agriculture teachers' perceptions who felt that if the headteacher had motivated them by giving some incentives, this would largely influence sustainability of the projects. Relationship between the head teacher and the Agricultural teacher and techniques required in carrying out the animal and plant husbandry practices had no significant influence on the sustainability of the ATPPs. Only a few of the headteachers perceived these as factors influencing the sustainability of the projects.

4.6 Objective 5: To determine the relationship between agriculture teachers' perceptions towards ATPPs and the sustainability levels of ATPPs initiated by Egerton university student teachers in Nakuru County secondary schoolsThe data for this objective were obtained from the agriculture teacher questionnaire. A likert scale was used and the mean perceptions calculated.

4.6.1 Hypothesis 5:

H_{o5}: *There is no statistically significant relationship between agriculture teachers' perception towards ATPPs and the level of sustainability of the projects initiated by Egerton university student teachers in secondary schools in Nakuru County.*

The hypothesis was tested using Pearson Moment correlation coefficient (PMCC). As shown in Table 21 in the previous section, no significant relationship was found between agriculture teacher's perception towards the projects and their sustainability. This is explained by their limited involvement in the conception, implementation, continuity and utilization of the projects. Specifically, Figure 4 illustrates the level of perception of the agriculture teachers in a continuum scale of 1 to 5.

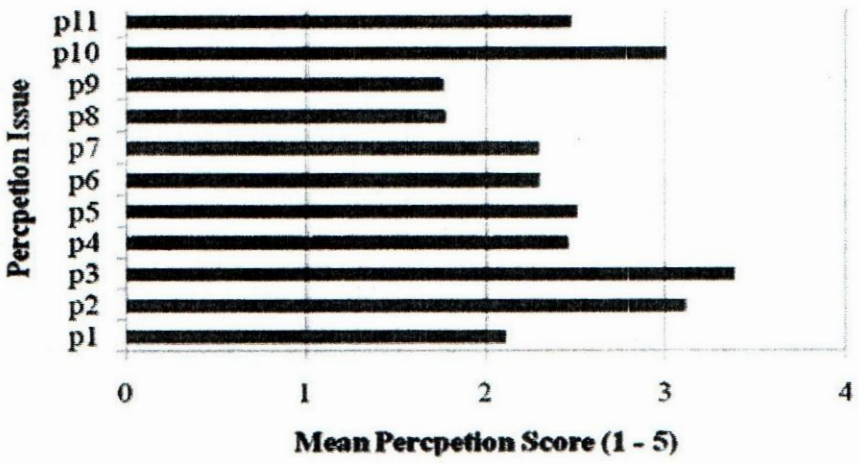


Figure 4: Relative scores of agriculture teachers' perception towards projects initiated by Egerton University students on TP in Nakuru district

Key to Perception Issues:

p1 Having a permanent responsible farm worker in charge of agriculture projects

p2 Giving agriculture teachers incentives to boost their morale in sustaining the projects

p3 The type of the project (whether livestock or crop

p4 The citing of the project

p5 Relationship between the agriculture teacher and the headteacher

p6 Availability of finances for the maintenance of the projects

p7 Availability of water for the projects

p8 Availability of labour especially during the vacations

p9 Availability of time for the sustenance of the projects

p10 Crop and animal husbandry techniques required for the various ATP projects

p11 Overall Agriculture teacher Perception

Majority of the agriculture teacher had the perception that the type of the project initiated was related to the project sustainability positively. Indeed this was found to be true while identifying the project factors that influenced sustainability of ATPPS. The perception issue the scored the highest index among the agriculture teachers is the perception that if the headteachers had given them some incentives to care for the, the sustainability levels of the same would have been very high. It is important to note here that that in one of the schools whose projects' sustainability index was the highest, the agriculture teacher was highly motivated. See Figure 4.

4.7 Objective 6: To determine the relationship between secondary school students' perceptions towards ATPPs and the level of sustainability of ATPPs initiated by Egerton university student teachers in Nakuru County secondary school.

Data for this objective were collected using a perception scale that was completed by secondary school students drawn from form three classes. The aim was to get a feeling of the attitudes of secondary school students towards the ATPPS and find out if these perceptions had any relationship with the sustainability of the projects.

4.7.1 Hypothesis 6

H_{06}: *There is no statistically significant relationship between secondary school students' perception towards ATPPs and the sustainability of the projects initiated by Egerton university student teachers in secondary schools in Nakuru County.*

The students' perceptions were based on their responses to the perception scale items in Appendix D. The items included: usefulness of agriculture teaching practice projects to students, frequency of use of the projects during agriculture lessons ,involvement by the TP teacher during the planning of the project, Involvement by the TP teacher during the implementation of the project, level of completion of agriculture TP projects before the teacher leaves the school involvement of students in the maintenance of the TP projects, usefulness of the TP project in helping students do well in the KSCE agriculture project, level of motivation by students to learn agriculture through projects established by student teachers on Teaching Practice, happiness in participating in the implementation of the Teaching Practice Projects, willingness to offer labour to the student teachers who initiate projects in my school, benefits to the school from the projects initiated by students on teaching practice.

The relationship between secondary school students' perception towards ATPPs on sustainability and ATPPs initiated by Egerton University Student teachers in Nakuru County secondary schools was tested using PMCC.A positive correlation coefficient of $r = 0.451$ (p-value = 0.013) was obtained and majority of the students (87.2%) had a positive attitude towards TP projects initiated by Egerton University students in the sampled schools. This finding was expected. According to Sheffield (1976), students develop positive attitudes towards agriculture projects especially if the are involved in the planning, implementation and scaling up stage of the project cycles.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the findings, conclusions and recommendations as well as suggestions for further research. The study was set out to determine the influence of selected factors on sustainability of ATPPs in secondary schools in Nakuru County. The objectives of the study were:

5.2 Summary

The purpose of this study was to determine the influence of selected factors on the sustainability of ATPPs initiated by student teachers from Egerton University in secondary schools in Nakuru County. The objectives of the study were: To determine the sustainability index of the ATPPs initiated in secondary schools in Nakuru County, to determine the influence of project factors on the sustainability of the ATPPs, to determine the influence of school characteristics on the sustainability of the ATPPs initiated by Egerton university student teachers in Nakuru County secondary schools, to determine the relationship between the Headteachers' perceptions towards ATPPs and the sustainability of the projects initiated by Egerton university student teachers in Nakuru County secondary schools, to determine the relationship between the Agriculture teachers' perceptions towards ATPPs and the sustainability of the projects initiated by Egerton university student teachers in Nakuru County secondary schools and finally to determine the relationship between the secondary school students' perceptions towards ATPPs and the sustainability of the projects initiated by Egerton university student teachers in Nakuru County secondary schools.

The hypotheses of the study were: There is no statistically significant influence of Project factors on sustainability of ATPPs initiated by Egerton university student teachers in Nakuru County secondary school, there is no statistically significant influence of Schools 'characteristics on sustainability of ATPPs initiated by Egerton university student teachers in Nakuru County secondary schools, there is no statistically significant relationship between headteachers' perception towards ATPPs and the level of sustainability of the ATPPs initiated by Egerton

university student teachers in Nakuru County secondary schools, there is no statistically significant relationship between agriculture teachers' perception towards ATPPs and the level of sustainability of the projects initiated by Egerton university student teachers in Nakuru County secondary schools and finally, there is no statistically significant relationship between secondary school students' perception towards ATPPs and the sustainability of the projects initiated by Egerton university student teachers in Nakuru County secondary schools

The study was conducted using a cross sectional survey research design. The target population of the study was all secondary schools in Nakuru County that offer Agriculture as a teaching subject. The sample consisted of 66 (i.e. two projects from each of the selected 33 co-operating secondary schools) Agriculture teaching Practice projects (ATPPs) initiated in secondary schools in Nakuru County, 33 head teachers and 33agriculture teachers in charge of agriculture projects. Data was collected using questionnaires, one for the head teacher and the other for the agriculture teachers. An observation profoma was used to collect data on the ATPPs based on the observations made.

Data was analysed using frequencies and percentages to describe the data based on the stated objectives and variables, while Chi-Square, ANOVA and Pearson's product moment correlation coefficient were used to test the hypotheses at 5% level of significance.The main finding of the study was that ATPPs are only moderately sustained in secondary schools, and that the following projects factors have a statistically significant influence on the projects' sustainability: involvements of the stakeholders during project planning, preparation and implementation, project organization, level of project attractiveness, level of complexity of husbandry techniques of projects, level of inclusion of high valued crop or animals, level of student involvement in decision making, amount of returns given to those who worked in the projects, the type of the project and continuity arrangements made by the student teachers from Egerton University. Failure by TP students to make proper continuity arrangements during project design, implementation and hand-over, is a major contributor to low ATPPs sustainability levels.

5.3 Conclusion

Based on the findings of the study, several conclusions related to the objectives set out for investigation in the study were made. The following conclusions were arrived at:

5.3.1 ATPPS sustainability index and level

Objective one: To determine the level of sustainability of ATPPs initiated by Egerton university student–teachers in secondary schools in Nakuru County

The sustainability level of the ATPPs was found to be moderate. The projects scored highly in completion index and scored very poorly on lifespan index. These findings are not shared with studies conducted on science teaching practice projects which posited that science teaching practice projects are durable and easily sustained. This is probably because most of the sciences teaching practice projects are teaching aids that are kept in the laboratories away from extreme effects of environmental factors unlike most of the agriculture projects that are carried out in the school farm. In addition, most agriculture projects deal with living systems that have continuous requirements that would affect their sustainability. Agriculture projects must be highly organized simply to keep plants and animals alive.

5.3.2 Influence of project factors on ATPPs sustainability

Objective two: To determine the influence of project factors on the sustainability of ATPPs initiated by Egerton university students-teachers in secondary schools in Nakuru County.

The findings of this study revealed that there was statistically significant influence of project factors on sustainability of the ATPPs. These factors included: continuity arrangements made by the student teachers before departure from the secondary schools, involvement of the stakeholders (school administration, agriculture teachers, secondary school students and school workers) in planning and implementation of the projects, amount of returns given to those who took care of the projects, type of the project, care given to projects during vacations, project organization, level of project attractiveness, level of complexity of husbandry techniques of the projects, level of inclusion of high valued crops or animals and level of secondary school students involvement in decision making especially in transportation and marketing of the produce from the projects.

5.3.3 Influence of school characteristic

Objective three: Determine the influence of school characteristics on the level sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

The findings showed that overall school characteristics (school location, school category and school status) did not have any statistically significant influence on project sustainability levels. However the sustainability index of ATPPs in schools located in rural areas was higher than that of projects in urban schools. In the same way the project sustainability index for projects in boarding schools was higher than those projects in day schools.

5.3.4 Relationship between headteachers' perceptions towards ATPPs on sustainability levels of ATPPs

Objective four: To determine the relationship between headteachers perceptions towards ATPPs and the sustainability levels of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

Results revealed that overall there was no significant relationship between the headteachers perceptions and sustainability of the projects. However further analysis of the individual aspects of perceptions showed that strong positive relationships existed between perceptions on financing of the projects and projects' sustainability. Most of the headteachers felt that citing of the projects influenced the sustainability levels of ATPPs. There was also a strong positive relationship between perceptions of having a permanent responsible worker in charge of the projects and projects' sustainability by the headteachers. Majority of the headteachers did not associate giving agriculture teachers' incentives after taking care of the projects, with sustainability of the ATPPs.

5.3.5 Relationship between agriculture teachers' perceptions towards ATPPs on sustainability levels of ATPP

Objective five: To determine the relationship between agriculture teachers' perceptions towards ATPPs and the sustainability levels of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County.

Analysis of this hypothesis revealed that overall there was no significant relationship between the agriculture teachers' perceptions towards ATPPs and the sustainability of the projects:

However, most of the teachers perceived lack of incentives from the headteachers to sustain the projects as having a major influence to projects' sustainability. Indeed in one of the schools whose projects' level of sustainability was very high (with an index of 4.5) the agriculture teacher was highly motivated receiving Ksh 8000 per month from the profits accrued from the projects.

5.3.6 Relationship between secondary school students perceptions on ATPPs on sustainability levels of ATPPs

Objective six: To determine the relationship between secondary school students' perceptions towards ATPPs and the level of sustainability of ATPPs initiated by Egerton university student teachers in secondary schools in Nakuru County .

The influence of secondary school students' perception towards ATP projects on sustainability of the ATP projects initiated by Egerton University Student teachers in Nakuru district secondary schools was tested using PMCC. A positive correlation coefficient of $r = 0.451$ (p-value = 0.013) was obtained and majority of the students (87.2%) had a positive attitude towards ATPPs initiated by Egerton University students in the secondary schools. There was a strong positive relationship between secondary school students' perceptions towards ATPPs and the projects' sustainability. Most students liked the idea of being involved in taking care of the projects.

5.4 Recommendations

The following recommendations were suggested from the study

1. Egerton University should review its policy on ATPPs to ensure that more of the ATPPs initiated in secondary schools are sustained. This can be done through advocacy with the stakeholders, the cooperating schools and the ministry of education. The policy should also include a review of agriculture teacher training so as to in co-operate course units that would better prepare the student teacher to plan and design more sustainable projects.
2. The following project factors should be considered in planning and designing of ATPPs: Involvement of the stakeholders during project planning and implementation, project organization, project attractiveness, level of complexity of husbandry technique, inclusion of high valued crop in the projects, a fraction of the returns from the projects should be given to those who worked in the project. Secondary school students should be involved in

decision making, (marketing and transportation) of the produce from the projects. This would motivate them to work in the ATPPs thus enhance sustainability of the projects.

3. Schools located in urban areas and day schools should be encouraged to design and establish ways of sustaining ATPPs. Responsible and permanent workers should be given the duty of caring for the projects when the students are away from day schools. Rain water harvesting and storage should be encouraged in urban schools for irrigation crops and feeding the animals during the time of shortage.
4. Most headteachers perceived citing of the ATPPs as a major contributor to the project sustainability. Possibly because many headteachers use management by walking around (MBWA) style of management, which means the more they get to see the projects the more they think about them and the more they remember to assign responsible workers duties to sustain the projects. As a recommendation therefore ATPPs should be cited in an area that is open and accessible.
5. Most agriculture teachers had the perception that if well motivated they would work hard to ensure sustainability of the projects. As a recommendation those teachers who work in ATPPs should be motivated by being given some of the produce generated from the projects or a portion of the returns from the projects in schools where the agriculture teachers were highly motivated the sustainability levels of the projects were very high.
6. Secondary school students should be involved in decision making processes within the project. A portion of returns from the project should also be given to those who work in the project. This would not only increase the project sustainability levels but would demonstrate agriculture as a profitable and dignified subject which is one of the aims of teaching agriculture in secondary schools.

5.5 Recommendations for Further Research

1. A study should be carried out from Egerton University perspective to find out whether the student teachers are adequately prepared to plan, design and implement sustainable ATPPs. This would also look into the role of the supervisors in designing and implementing sustainable projects.
2. Agriculture education is now being faced with the problem of remaining relevant in a rapidly changing world and is threatened with an "Adapt- or-Perish" situation. For

agriculture education to sustain its relevance it must Shift in focus from agriculture to rural development, rapid population growth rates and urbanization, HIV/AIDS, environmental degradation, sustainable water use, unpredictable weather and climate change, increases in incomes and wealth, globalization, trade liberalization, and market deregulation, scientific progress including developments in biotechnologies, rapid developments in information and communication technologies (ICTs), Vandenbosch (2006).This study therefore suggests that, studies be conducted to find out how these areas can be incorporated designing of the ATPPs.

3. A different research design (Probably an experiment or a case study) should be used to carry out this same study using similar independent and dependent variables, this might bring out some ATPPs sustainability factors that have been masked in the survey design..
4. There is need to find out if introducing project management course to Egerton AGED students would prepare them better in initiating more sustainable projects.

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APPENDICES

APPENDIX A: OBSERVATION PROFOMA

Observation Item 1

Name the projects

A _____

B _____

Year when the project was initiated

	2001	2002	2003	2004	2005
PROJECT A					
PROJECT B					

Are the projects still in existence?

Project A No ☐ Yes ☐

Project B No ☐ Yes ☐

Observation Item 2

Levels of completion	0%	25%	50%	75%	100%
Project A					
Project B					

Observation Item 3

Project continuity level	1	2	3	4	5
Project A					
Project B					

Observation Item 4

Level of utilization by agric. Teachers and students	1	2	3	4	5
Project A					
Project B					

Key: 1- least utilized

5 – most utilized

Observation Item 5

Level of utilization by the school community	1	2	3	4	5
Project A					
Project B					

Key: 1- least utilized

5 – most utilized

Observation Item 6

Condition of the projects	1	2	3	4	5
Project A					
Project B					

Key: 1 – worst condition

5 – excellent condition

Observation Item 7

Number of ATPPs initiated in the school during the past five years, from 2001-2005

0-1 ☐

2-3 ☐

4-5 ☐

6 and above ☐

Number of ATPPs still in existence to date.

0-1 ☐

2-3 ☐

4-5 ☐

6 and above ☐

Observation item 8

PROJECT FACTOR	PROJECT	1	2	3	4	5
Level of records availability	A B					
Level of Project organisation	A B					
Level of project's Attractiveness	A B					
Level of Complexity of the husbandry techniques required In the projects	A B					
Level inclusion of a high valued crop that can be marketed for cash	A B					
Fraction of the returns that goes to those who worked in the projects	A B					
Level of students' involvement in decision-making	A B					
Level of students' involvement in marketing of the produce	A B					
Level of students' involvement in transportation of produce	A B					

APPENDIX B: HEADTEACHER'S QUESTIONNAIRE(AGRICULTURE TEACHING PRACTICE PROJECTS)

1. Kindly respond to all items given in this questionnaire as honestly and accurately as possible
2. All your responses will be treated with confidentiality as much as possible and will be used for the purpose of this research only
3. Kindly complete the preliminary information before responding to the questions given in the main part of the questionnaire

Section A: Background Information

Please tick in the appropriate box

1. Education level
   - Diploma ☐
   - Bachelor's Degree ☐
   - Master's degree ☐
   - PhD ☐
2. Area of specialization
   - Languages ☐
   - Humanities ☐
   - Sciences ☐
   - Technical ☐
   - Mathematics ☐
3. Number of years in your current station
   - 0-5 years ☐
   - 6-10 years ☐
   - 11-15 years ☐
   - 16-20 years ☐
   - 20 and above ☐
4. Gender
   - Male ☐
   - Female ☐

Section B: School Characteristics

5. Location of the school

Rural ☐

Urban ☐

6. School status

Provincial ☐

District ☐

Private ☐

7. Type of the school

Day ☐

Boarding ☐

Day and boarding ☐

8. Indicate the divisional location of your school e.g. Bahati, Njoro etc.

_____

Section C: Head teacher's Perceptions towards TP projects

Please use the scale below to indicate your opinion about the following items concerning the ATPPs. Tick in the box that closely approximates your level of agreement. Please do not skip any statement and do not put more than one tick in response to one statement.

1- Strongly agree (SA)

2-Agree (A)

3-Neither agrees nor disagrees (NN)

4-Disagree (D)

5-Strongly disagree (SD)

	SA	A	NN	D	SD
1. Agriculture projects initiated by TP teachers are very useful to this school	☐	☐	☐	☐☐	
2. The benefits obtained from the projects are worthy the cost incurred in initiating the projects	☐	☐	☐	☐	☐
3. The school has saved the costs of purchasing teaching and learning resources as a result of TP projects	☐	☐	☐	☐	☐
4. The produce obtained from the projects has assisted the schools through provision of food to the school.	☐	☐	☐	☐	☐
5. The students utilize the TP projects during practical work	☐	☐	☐	☐	☐
6. I am always involved by the student teacher during planning of the projects	☐	☐	☐	☐	☐
7. I am always involved during the financing of the projects	☐	☐	☐	☐	☐
8. I will always fund the TP projects	☐	☐	☐	☐	☐
9. I am always involved in the maintenance of the Projects	☐	☐	☐	☐	☐
10. TP projects waste school's funds	☐	☐	☐	☐	☐
11. TP projects are not necessary in my school	☐	☐	☐	☐	☐
12. TP projects do not improve teaching and learning in my school	☐	☐	☐	☐	☐
13. The projects are a nuisance to the school	☐	☐	☐	☐	☐
14. I feel that my agriculture teachers are highly motivated to take care of the projects	☐	☐	☐	☐	☐
15. In my opinion, the commitment of the agriculture teacher determines whether the projects are sustained or not	☐	☐	☐	☐	☐
16. My working relationship with the agriculture teacher Influences the projects' sustainability	☐	☐	☐	☐	☐
17. If there was a permanent, responsible farm worker in					

Charge of the agriculture projects / practical TP
projects would be sustained in my school. ☐ ☐ ☐ ☐ ☐

18. If I gave half of the returns from the projects
To those who take care of it, TP projects would
Be sustainable in my school. ☐ ☐ ☐ ☐ ☐

Factors Affecting TP Project Sustainability

Please indicate by ticking any of the following factors, which according to your influence TP projects sustainability in your school?

☐ Having a permanent, responsible farm worker in charge of agriculture projects

☐ Giving agriculture teachers incentives to boost their moral in sustaining the projects

☐ The type of the project, whether livestock or crop project

☐ The citing of the project

☐ The relationship between the agriculture teacher and the head teacher

☐ Availability of finances for maintenance of the projects

☐ Water availability for the projects

☐ Labour availability especially during vacations

☐ Time availability for the project sustainability

☐ Crop or animal husbandry techniques requirements for various agriculture TP projects

☐ Other Factors (Please Specify):

_____

_____

_____

END

Thank you for your cooperation, God bless you.

APPENDIX C: QUESTIONNAIRE FOR AGRICULTURE TEACHERS

1. Kindly respond to all items given in this questionnaire as honestly and accurately as possible
2. All your responses will be treated with confidentiality as much as possible and will be used for the purpose of this research only
3. Kindly complete the preliminary information before responding to the questions given in the main part of the questionnaire.

Section A

Background Information

1. Education level
   - Diploma ☐
   - Bachelors' degree ☐
   - Master's degree ☐
   - PhD ☐
2. Number of years in current station
   - 0-5years ☐
   - 6-10 years ☐
   - 11-15 years ☐
   - 16-20 years ☐
   - 20 and above
3. Gender Male ☐ Female ☐

Project Factors

Types of projects

4. (a) List the various Agriculture teaching practice projects (ATPPs) that have been initiated in your school from the year 2002-2006

i. _____
ii. _____
iii. _____
iv. _____
v. _____

b) Out of the projects named in 4(a) above, list those that are still in existence

i)
ii)
iii)
iv)
v)

c) Out of those projects named in 4(b) above, list those that are functional

i)
ii)
iii)
iv)
v)

d) List the projects that were never completed by the student teachers.

i)
ii)
iii)

e) Out of the projects still in existence state, by ticking, the level of utilization by the students and teachers

	Name of project	Fully utilized	Mostly utilized	Not sure	Partly utilized	Not utilized
1						
2						
3						
4						
5						

Continuity arrangements made

5. The agriculture student teacher is supposed to hand over the TP project to somebody before his departure. Indicate by ticking appropriately the person in charge of these projects.

- ☐ Students
- ☐ Agriculture teacher
- ☐ Head of agriculture subject
- ☐ Head teacher
- ☐ Nobody

6. The TP projects may require some finances for continuity and maintenance. Indicate the level of availability of these funds as far as TP projects are concerned.

- ☐ Highly available
- ☐ Available
- ☐ Scarcely available

☐ Not available

☐ Not sure

7. Smooth running of TP projects may be interrupted during long vacations, indicate by ticking, the person who takes care of the projects during this time

☐ Agriculture teacher/Head of subject

☐ Students

☐ School workers

☐ Head teacher

☐ Nobody

Planning of ATPPs

Planning of TP projects is important. There are various stages in the planning process that are important in ensuring sustainability of such projects. Please respond to the following items appropriately by ticking in the box.

8. Does the student teacher involve all the stakeholders (headteacher, agriculture, students, young farmers club, worker in charge of agriculture projects), in analysing and selecting appropriate agriculture projects for your school priorities to major problems in your school and come up with the most suitable project.

☐ Yes ☐ No

Agriculture teacher's perceptions towards teaching practice projects (ATPPs)

Key

SA – Strongly Agree; A =Agree U= Undecided; SD = Strongly Disagree D=Disagree

	SA	A	U	D	SD
1. Agriculture projects initiated by TP teachers are very useful to this school	☐	☐	☐	☐	☐
2. The benefits obtained from the projects are worthy the cost incurred in initiating the projects	☐	☐	☐	☐	☐
3. The school has saved the costs of purchasing teaching and learning resources as a result of agriculture TP projects	☐	☐	☐	☐	☐
5. The students utilize the ATPPs during practical work	☐	☐	☐	☐	☐
6. I am always involved by the student teacher during					

selection of the projects	☐	☐	☐	☐	☐
7. I am always involved in the maintenance of the Projects	☐	☐	☐	☐	☐
8. TP projects waste school's funds	☐	☐	☐	☐	☐
9. TP projects do not improve teaching and learning in my school	☐	☐	☐	☐	☐
10. The projects are a nuisance to the school	☐	☐	☐	☐	☐
11. I feel that I am highly motivated to take care of the projects	☐	☐	☐	☐	☐
12 My commitment determines whether the projects are sustained or not	☐	☐	☐	☐	☐
13. My working relationship with the head teacher influences the projects' sustainability	☐	☐	☐	☐	☐
14. if there was permanent , responsible farm worker in charge of agric projects,/ practicals , TP projects would be sustained in my school.	☐	☐	☐	☐	☐
15. If half of the returns from the projects would go to those who take care of them, TP projects would be sustainable in my school.	☐	☐	☐	☐	☐
16. Proper allocation of various responsibilitiesin ATPPs can help to sustain the projects.	☐	☐	☐	☐	☐
17. ATPPs are relatively attractive to the students	☐	☐	☐	☐	☐
18. There are accurate records allocating duties to various students who work on the agricultural projects	☐	☐	☐	☐	☐
19. Students who work on the projects are organized in groups	☐	☐	☐	☐	☐
20. I always have spare labour for the projects incase the students responsible falls sick	☐	☐	☐	☐	☐
21. When students are not available, labour is always employed	☐	☐	☐	☐	☐
22. Project work does not overload anyone to a point of fatigue	☐	☐	☐	☐	☐
23. There is always high-value crop/animal that is marketed for cash in one of the projects.	☐	☐	☐	☐	☐
24. 10% the profit is put in contingencies and occasional crop failure	☐	☐	☐	☐	☐
25. Hard physical project work is always combined with pleasurable activities offered	☐	☐	☐	☐	☐
26. Projects have access to adequate capital before each season which obtainable on short notices if necessary	☐	☐	☐	☐	☐

27. Agriculture teachers have extra skills needed to handle any project	☐	☐	☐	☐	☐
28. I always keep records carefully of all work done in the projects.	☐	☐	☐	☐	☐
29. I always give students chances to make decisions concerning the project	☐	☐	☐	☐	☐
30. I always allow the students to participate in marketing of the produce obtained from the projects	☐	☐	☐	☐	☐

Factors Affecting TP Project Sustainability

Please indicate by ticking any of the following factors, which according to you influence TP projects sustainability in your school?

- ☐ Having a permanent, responsible farm worker in charge of agric projects
- ☐ Giving agriculture teachers incentives to boost their moral in sustaining the projects
- ☐ The type of the project, whether livestock or crop project
- ☐ The citing of the project
- ☐ The relationship between the agriculture teacher and the headteacher
- ☐ Availability of finances for maintenance of the projects
- ☐ Water availability for the projects
- ☐ Labour availability especially during vacations
- ☐ Time availability for the project sustainability
- ☐ Crop or animal husbandry techniques requirements for various agriculture TP projects
- ☐ Other Factors (Please Specify):

_____

_____

END

Thank you for your cooperation, God bless you.

APPENDIX D: PERCEPTION SCALE FOR SECONDARY SCHOOL STUDENTS

1. Kindly respond to all items given in this questionnaire as honestly and accurately as possible
2. All your responses will be treated with confidentiality as much as possible and will be used for the purpose of this research only
3. Kindly complete the preliminary information before responding to the questions given in the main part of the questionnaire.

Key
SA – Strongly Agree; A =Agree U= Undecided; SD = Strongly Disagree D=Disagree

	SA	A	U	SD	D
Agriculture teaching practice projects are useful to me					
We often use the projects during agriculture lesson					
Students were involved by the TP teacher during the planning of the project					
Students were involved by the TP teacher during the implementation of the project					
The agriculture TP projects are always competed before the teacher leaves the school					
Students are involved in the maintenance of the TP projects					
The TP project are useful in helping me do well in the KSCE agriculture project					
I feel motivated to learn agriculture through projects established by student teachers on Teaching Practice					
I feel happy participating in the implementation of the Teaching Practice Projects					
I do not mind offering labour to the student teachers who initiate projects in my school					
Our school benefits greatly from the projects initiated by students on teaching practice					

1. List the topics that you studied using the project as a teaching and learning resource
    1. _____
    2. _____
    3. _____
    4. _____
    5. _____
2. In your opinion, what would make these projects more useful and long lasting in your school?
    1. _____
    2. _____
    3. _____

APPENDIX E: SAMPLING FRAME (LIST OF SECONDARY SCHOOLS IN NAKURU

WHERE EGERTON UNIVERSITY STUDENTS HAVE INITIATED TP PROJECTS)

Schools	Category	Type	Day/Boarding
1. Afraha high school	P	Mixed	D
2. Athinai high school	D	Mixed	D
3. Bahati girls high school	P	Girls	B
4. Bahati PCEA high school	D	Mixed	B
5. Bethwell Girls high school	D	Girls	B
6. Bishop Ndingi high school	PR.	Mixed	B
7. Cheptoroi secondary school	D	Mixed	D
8. Christ the king high school	PR.	Girls	B
9. Crater view high school	D	Mixed	D
10. Elbagon Baptist high school	PR.	Mixed	B/D
11. Flamingo high school	P	Mixed	D
12. Freds Academy secondary school	PR	Mixed	B/D
13. Gilgil day high school	D	Mixed	D
14. Gilgil high school	PR	Boys	B
15. Jolly Jeddy high school	PP	Girls	B
16. Jomo Kenyatta high school	P	Mixed	D
17. Kalsa high school	PR	Mixed	D
18. Kambala high school	D	Girls	B
19. Kenyatta high school	D	Mixed	D
20. Kilimo high school	D	Mixed	D
21. Kirobon high school	P	Mixed	B
22. Koelel high school	P	Boys	B
23. Lanet mixed high school	D	Mixed	D
24. Langalanga high school	D	Mixed	D
25. Larmudiac high school	P	Mixed	B/D
26. Loreto high school	PR.	Boys	B
27. Mama Ngina Kenyatta high school	D	Mixed	B
28. Mariagoretti high school	PR	Girls	B
29. Mary mount secondary school	P	Girls	B
30. Mastered seed private high school	PR.	Mixed	D
31. Mau Narok high school	D	Mixed	D
32. Mau Samit high school	D	Mixed	D
33. Mbomasan high school	D	Mixed	D
34. Mema high school	D	Mixed	D
35. Menengai high school	P	Mixed	D
36. Michinda Secondary school	P	Mixed	D/B
37. Mogoini high school	D	Mixed	D

38. MoiAmalo high school	D	Mixed	D/B
39. Moi forces high school	N	Girls	B
40. MoiNdeffo high school	D	Mixed	D
41. Moi secondary school	D	Mixed	D
42. Molo academy high school	P	Mixed	B
43. Mugumu secondary school	PR	Mixed	B/D
44. Mukuru private high school	PR	Girls	B
45. Muthaiti high school	PR	Girls	B
46. Naivasha day high school	D	Mixed	D
47. Naivasha girls High school	P	Girls	B
48. Nakuru blanket	P	Mixed	D
49. Nakuru day high school	P	Mixed	D
50. Nakuru high school	N	Mixed	B
51. Nakuru west high school	D	Mixed	D
52. Njengakarume high school	D	Mixed	D
53. Njoro academy high school	PR	Mixed	D
54. Njoro boys high school	P	Boys	B
55. Njoro girls high school	P	Girls	B
56. Njoro day high school	D	Mixed	D
57. Olengurone high school	D	Mixed	D
58. Pleasant view high school	P	Mixed	D
59. Rachael girls	PR	Girls	B
60. Rift valley Adventist high school	PR	Mixed	D
61. Rongai high school	PR	Boys	B
62. Shinners Girls high school	PR	Girls	B
63. Solai secondary school	D	Mixed	D
64. St. Anne high school	D	Girls	B
65. St. Francis Lare secondary school	PR	Girls	B
66. St. Gabriel high school	PR	Mixed	D
67. St. Syvias high school	PR	Mixed	D
68. Subukia day high school	D	Mixed	D
69. Summerfield (Columbus) high school	PR.	Mixed	D
70. Teret high school	D	Mixed	D
71. Tumaini House high school	D	Mixed	D
72. Uhuru high school	D	Mixed	D
73. Upperhill secondary school.	D	Mixed	D
74. Victonel high school	PR	Mixed	D
75. Wendani High school	D	Mixed	D

Source: Department of Agricultural Education and Extension, Egeron University 2008

APPENDIX F: TP PROJECT MARKING SCHEME

NAME: ..... REG. NO.....

SCHOOL..... SUBJECT.....

1. PROJECT PROPOSALS (25% MARKS))
   - Syllabus/scheme/major topic coverage
   - Pedagogical justification (clear)
   - Project design/description
   - Well thought out calendar events
   - Reasonable budget
   - Proposal write up e.g. neatness, layout

II. ACTUAL PROJECTS (50MKS)
   - Originality/creative/improvisation
   - Quality of final project – workshop
   - Portability – convenience during teaching
   - Workability – including calibration/work facilitation
   - Oral presentation – demonstration, evidence of data, pupil presentation
   - Consistence with proposal e.g. actual cost against planned cost

III. FINAL WRITTEN REPORTS (25 MARKS)
   - Report layout e.g. title page, topic, outline, footnotes, bibliography etc
   - Versatility of project in teaching
   - How project will be used in teaching
   - Review the project in relation to the work plan shortcomings, conclusions and recommendations

GRAND TOTAL

Examiner's name .....

Signature .....

Date .....

APPENDIX G: GUIDELINES FOR AGRICULTURE PROJECT WORK

1. Realize that many agricultural topics require small instructional groups, in which each member has a chance to practice what is being taught with his own hands.

2. Organize practical instruction in the form of coherent projects, starting with those that are small and relatively attractive (keeping a goat. growing fruit trees, etc.).

3. Be sure a full-time member of the senior staff has direct responsibility for the practical aspects of instruction, especially if there is a distinct farm.

4. Obtain accurate operational instructions (on husbandry technique, soil requirements, planting instructions, disease problems, etc.) for each crop before it is added to the instructional program.

5. Allocate responsibility for all crops clearly. Every practical task should be clearly assigned, so each individual knows when and where his contribution is required and so accurate records of participation can be kept. Otherwise, no one feels personally obligated to perform (he unpleasant tasks-of which there are many in farming.

6. Have spare labour available. Students should be grouped in pairs (of their own choosing) so that if one is sick his buddy can be responsible for completing scheduled work.

7. Be prepared to employ labour when students are not available. Especially where animals are kept, it is essential to employ extra labour during vacations,

8. Organize work schedules carefully: a) to integrate practical experiences with lectures; b) to insure a fair distribution of work; and c) to accomplish essential tasks without overloading anyone to the point of fatigue,

9. Include at least one high-value crop that can he marketed for cash; see that at least half of the returns go directly to those who did the work.

10. Retain all profits within the training program if possible; try to set aside a reasonable proportion (10 per cent or more) in a contingency fund for emergencies and occasional crop failures.

11. Make every attempt to see that hard physical work is combined with pleasurable activities afterward. By creating a pleasurable context or such activity, youth will learn that hard work can be enjoyed.

12. Insure that the program has access to adequate capital bet ore each season, obtainable on short notice if necessary.

13. Use Field trips to include marketing and agricultural economics in the syllabus.

14. Be sure some staff member has the extra skills needed before adding, expensive farm mechanization or high-value cattle. Such enterprises require the presence of great technical expertise. It is not safe to rely on outsiders for this purpose.

15. Keep careful records of all work and accounts for use in farm-management instruction. Students themselves should keep these records, and should meet weekly' to review management decisions.

16. Select instructional materials to cover the full scope of farming activities, to include references to more specialized work where further information is needed, to show all essential operations in clear teach-yourself fashion, and to be of a type that can be taken by students when they leave.

17. Set up a system for continuous evaluation of student performance, with close attention to practical work. Project marks should count equally with academic marks, while in-term marks should probably count more than end-of-term examination scores.

18. Try to see that the best students, and the best staff, qualify for further training "in subjects in which they show special skill.

19. Set up a special program for recruiting and training junior staff involved in the program. Because agricultural instruction requires small groups and farm practical, much of it will probably be done by non-senior staff. Older students (in their second or third years) should teach the younger, or extra, junior staff that are highly motivated and trained on-the-job should be added.

20. Allow for student options within the total course. Individuals do not all share the same aptitudes and interests, and it is to the nation's benefit if people are encouraged to specialize in the areas they like and in which they can do best.

21. Give students as much practice in decision-making as possible, within a realistic managerial context. Many farm schools have set up complete small holdings, which students lake full charge of and which they operate in teams of four or five students. People learn by having the chance to make mistakes, but such mistakes are less costly if they lake place on the limited scale of a small holding unit.

22. Use farm mechanics to acquaint students with a wide range of technological items, not just the use of ploughs or tractors. Students need to learn simple electronics, as well as such safety procedures as the handling of dangerous chemicals.

23. Give as much attention to marketing and transportation organization as to farm management itself; in real life, most farmers organize their own marketing.

APPENDIX G: LETTER OF RESEARCH AUTHORIZATION

MINISTRY OF SCIENCE & TECHNOLOGY

Telegrams: SCIENCE TEC", Nairobi

Fax No.
Telephone: 318581
When replying please quote

JOGOO HOUSE
HARAMBEE AVENUE
P. O. Box 60209-00200
NAIROBI
KENYA

MOST 13/001/37C 61/2

12th February 2007

Nancy Witherero
Egerton University
P.O. Box 536
NJORO

Dear Madam

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *Influence of Selected Factors on Sustainability of Agriculture Projects Initiated in Secondary Schools in Nakuru District by Egerton University Student Teachers*

I am pleased to inform you that you have been authorized to carry out research in Nakuru District for a period ending 30th October 2007.

You are advised to report to District Commissioner and the District Education Officer Nakuru District before embarking on your research project.

On completion of your research, you are expected to submit two copies of your research report to this office.

Yours Faithfully,

B. O. ADEWA
FOR: PERMANENT SECRETARY

Copy to:

The District Commissioner
Nakuru District

The District Education Officers
Nakuru District

APPENDIX H: RESEARCH PERMIT

PAGE 2

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss. NANCY WAITHERERO CHEGE

of (Address) EGERTON UNIVERSITY P.O. BOX 536 NJORO

has been permitted to conduct research in

Location,

NAKURU District,

RIFT VALLEY Province,

on the topic INFLUENCE OF SELECTED FACTORS ON SUSTAINABILITY OF OF AGRICULTURE PROJECTS INITIATED IN SECONDARY SCHOOLS IN NAKURU DISTRICT BY EGERTON UNIVERSITY STUDENT TEACHERS

for a period ending 30 OCT., 20 07

PAGE 3

Research Permit No. MOST 13/001/37 C 61

Date of issue 12.2.2007

Fee received SHS.500.00



Applicant's Signature

FOR: Permanent Secretary Ministry of Science and Technology

CONDITIONS

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

GPK 6055—3m—10/2003

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

(CONDITIONS—see back page)