Using Community Learning Resources to Enhance the Acquisition of Science Process Skills

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Abstract: **- Current curriculum reforms in science education calls for a new look at using community resources. The science syllabi require access to the world beyond the classroom so that students get educational experiences that can diversify the array of learning opportunities and connect school lessons with daily life and real problems. A schools' immediate community is a wonderful curriculum laboratory, which can provide extremely dynamic, interesting and real life opportunities for the acquisition of science process skills which include: observation, classification, measurement, inference, prediction and communication. In view of that, this study was conducted to investigate the use of community resources in helping students acquire science process skills. The study resides in a general survey model (Karasar, 1999).The study targeted form four students in 33 secondary schools of Uasin Gishu County. Data was collected from a sample of 186 form four students using self administered questionnaire. Data was analyzed by use of descriptive statistics and inferential statistics. Correlation was employed to establish the association while multiple regressions were used to test the study hypotheses. The results revealed that use of school grounds, objects and specimens; use of zoos, parks and botanical gardens; resource persons; museums; models and dioramas exert statistically significant effect on the student's acquisition of science process skills. It is recommended that school management should support the use of community resources by allowing and facilitating students to go for out-of-classroom activities and closely monitoring their full participation. Further, resource persons should be occasionally engaged in teaching and learning since they are full of memory, experience and expertise. This study provides theoretical insight that community resources can help students make connections between learning science skills and applying them in daily life.**

Keywords: **- Community resources, Science process skills, Kenya**

Paper type: - Research paper

I. INTRODUCTION

Out-of-classroom activities are indispensable parts of learning experiences. These activities enable learners acquire both science process skills and learning scientific method for learning experiences. Benchmarks for Science Literacy emphasize the importance of skills development in preparing students to "make their way in the real world, a world in which problems abound-in the home, in the workplace, in the community and on the planet. If science is to be learned effectively, it must be experienced. Use of community resources helps teachers to give students more opportunities to 'do science' to ask questions, test ideas, get their hands on real science activities as suggested by Braund and Reiss, (2004). Science is so close to the life of every girl and boy that no teacher need ever be without first-hand materials for the study of science. The world within us, beneath us, around us and above us, in any part of the globe, provides an inexhaustible supply of phenomena which can be used as the subject-matter of science teaching, and of materials which can be used to construct scientific equipment and teaching aids. Thus, various studies have been carried out to specify the role of community resources in developing science process skills in learners (West, 1972; Lynch & Ndyetabura, 1983; Gayford, 1988; Swain, Monk & Johnson, 1999; Johnstone & Al-Shuali, 2001; Kocakülah & Kocakülah, 2001).

It is important, therefore, to empirically examine the relationship between community resources and development of science process skills in learners. It is assumed that this study will fulfill this gap in science education in Kenya. This study aims to determine the relationship between community resources and development of science process skills in learners. This paper is organized as follows:

- Providing a literature review on science process skills and community resources;
- Developing a research model based on literature review;
- Hypotheses development
- Addressing the research methods;
- Discussing the research findings; and
- Discussing the practical and managerial implications of this study.

1.2 Literature review

1.2.1 Science process skills

The processes of doing science are the science process skills that scientists use in the process of doing science. Since science is making observations of the world around us and asking questions and finding answers to questions, science process skills are the same skills we all use in our daily lives as we try to figure out everyday questions. When we teach students to use these skills in science, we are also teaching them skills that they will use in the future in every area of their lives (Maarschalk, 1988). These scientific methods and values include seeking to answer questions using some kind of evidence, recognizing the importance of rechecking data, and understanding that scientific knowledge and theories change over time as more information is gathered. The science process skills form the foundation for the scientific method and include observation, classification, measurement, inference, prediction and communication. These basic skills are integrated together when scientists design and carry out experiments. Using resources within the schools or in the neighborhood will enable students develop science process skills. All the six basic skills are important individually as well as when they are integrated together.

According to Braund and Reiss, (2004), students should come away from our classrooms with an appreciation of the natural world- fascinated by its intricacies and excited to learn more. They should view and value science as a multi-faceted, flexible process for better understanding of the world. Such views encourage life-long learning and foster critical thinking about everyday problems students face in their lives. Fortunately, fostering such understandings needn't require reorganizing the entire curriculum. Simple shifts on how content and activities are approached can make a big difference in overcoming student misconceptions and building more accurate views of the process of science.

The Kenya Institute of Curriculum Development (KICD) biology syllabus requires access to the world beyond the classroom so that students will see the relevance and usefulness of science both in and out of school. The study of Biology aims at equipping the learner with the knowledge, attitudes and skills necessary for controlling and preserving the environment. The subject enables the leaner to appreciate humans as part of the broader community of living organisms. This subject is important in fields such as health, agriculture, environment and education. Biology is the precursor of biotechnology which is a tool for industrial and technological development. The content has been carefully reorganized to ensure that the required concepts and skills are realized. Sufficient practical activities have been suggested. The KICD recommends that the teachers use discovery method in achieving the objectives of this subject and highly encourages teachers to improvise using locally available materials to reduce costs.

Maarschalk, (1988) noted that changing the educational experiences of children by moving beyond the classroom walls can diversify the array of learning opportunities and connect school lessons with daily life and real problems, so that they realize the intertwining nature of science, technology and society. Away from the structure of the classroom, many characteristics of constructivism, a key idea in the current reforms, clearly emerge. They experience, create, and solve problems together. Social discourse and direct experience help them construct an understanding of the phenomenon Semper, (1990). Teachers always face the task of pulling together the diverse understandings their students bring to the classroom. The use of community resources provides a shared memory for the both teachers and students. What was learned is, thus, reinforced and extended in later discussions as the teacher refers to field observations (Braund and Reiss, 2004). Teachers can effectively develop interdisciplinary units with their students outside of the classroom. The world is not made up of discrete disciplines. Subject matter barriers dissolve as students learn from their environment.

Community resources that can enhance mathematics and science learning include nature education centers which include museums, zoos and parks, aquaria, botanical gardens), resources within the school ground and near the school (a nearby creek, pond, city street, health centers, or business), resource persons in the community, and materials that can be borrowed or purchased (models and dioramas), internet or e-mail communications.

1.2.2 Resources near the School

According to Knapp, (1996), lack of a nearby science center need not be a limitation. Community resources include unconventional sites, such as the factory, farm, or ranch. While extended field trips can be rewarding, short school yard trips can be equally valuable. These allow students to discover answers for themselves in a familiar context. Whether your school is urban, suburban, or rural, it reflects the habitat of its neighborhood-the hard-topped surfaces, the soils, grasses, and trees, the weather, and so on. The young inquirer can easily return to the school yard for further data gathering if a question is left unanswered or new questions arise. A class studying the sun and its shadows in a particular location, for example, can gather data at intervals throughout the day.

The United Nations Education Scientific and Cultural Organization source book for science learning outlines numerous resources for out-door science learning. An abandoned farm field offers an excellent opportunity to observe the process known as succession. The earliest plants that seed into the field are called pioneer plants. As the field community (ecosystem) changes with time, some populations are replaced by others. This replacement of populations is called ecological succession. It is often possible to observe a mature area such as a forest adjacent to a recently abandoned field. It is interesting to study the various stages of development and to infer what the intermediate stages must be. A wood or forest near the school may be instructive for discovering seasonal changes in animals and plants; studying habits of plants and animals; finding out where animals live; seeing how animal and plant life depend on each other; seeing how physical surroundings, such as moisture, temperature and amount of sunlight affect living things; finding examples of useful and harmful animals and plants. Possible use: arrange a field trip to observe and collect materials; bring selected materials into the classroom. A sawmill may be instructive for observing changes in animal and plant life when an area has been cleared. Possible activities include visiting a saw mill observing samples of wood to see growth rings for studying primary and secondary growth in trees. A farm may be instructive for observing various ways of preserving and storing food; caring for animals; growing garden vegetables and flowers; observing the use of machines in house, field, barn, garden, orchard; observing how buildings and grounds are protected against fire and how accidents are prevented (UNESCO, 1978).

A vegetable and flower garden may be instructive for studying how plants get enough light, moisture and other essentials for growth; learning how ground is prepared for planting, how plants are transplanted, and how seeds are dispersed; studying how flowers are self- and cross-pollinated and how seeds sprout and grow; learning what kinds of soil are suitable for the growth of different kinds of plants and how the soil is tested; observing how plants store food and how plants change with the seasons. Possible activities include visiting the garden to observe plants and methods of growth; making collections of seeds and fruits that show methods of dispersal; sprouting seeds in the classroom to learn more about how plants grow; performing experiments with plants to see the effects of light, temperature and moisture on growth; planting a school garden (if practicable) to learn more about how plants grow. A creek or pond may be instructive for observing kinds of plant life and the adaptations of stems, roots, leaves, flowers and fruit to a moist environment; learning how animals are adapted for life in or near water and contrasting this with land animals; observing how these animals and plants change as the seasons change; observing the food-getting and home-building habits of the animal life (UNESCO, 1978).

The value of the resources depends on how skillfully they are used. Braund and Reiss, (2004), suggest that, each resource should be used for a definite purpose or purposes: to help solve a problem, to make a scientific principle more graphic, to increase the tendency of learners to inquire about their environment thus enhancing the development of science process skills. In preparing for a trip, the teacher and learners should have clearly in mind a definitely stated problem or problems. The teacher should make sure that the students understand the purpose of the visit, and should also keep explanations easy enough for the students to understand. Follow-up discussions should be carefully planned. Appropriate data should be used in solving the problem, and written records made of the findings whenever it seems likely that the learners will have a use for the records thus development of science process skills Knapp, (1996).

1.2.3 Nature Education Centers

According to Braund and Reiss, (2004), a learning activity must have a purpose or reason so community resources should be thought of as part of the curriculum. As such, they should provide something to think about as well as something to do or some place to go. If possible, the teacher will want to visit the nature education center before the field trip to help her balance the needs of the teaching unit with the resources of the site. She can then focus on those exhibits that demonstrate the concepts she is teaching and match the students' cognitive levels. Learning activities are prepared for use before, during, and after the field trip and include student orientation material, such as a map, a list of exhibits to be visited (although they could visit others), and the educational objectives of the trip. Students generally find interactive exhibits engaging. These exhibits can be appealing and effective tools for teaching science and mathematics and for generating a positive attitude toward learning these subjects.

1.2.4 Facilities for teaching science

A science corner can be set aside a corner in the classroom for display and experimenting purposes. Students should be encouraged to bring in objects and specimen to display in the Science corner. Students should also be encouraged to constantly bring to school interesting items they have clipped from newspapers or magazines. The science bulletin board placed just above the tables in the Science corner provides a place to display such materials, as well as drawings and other things prepared in science classes. Once learners become interested, they are insatiable collectors. Some of the things they collect are bound to find their way to school. Such activities should be encouraged. One way to do this is to provide a museum shelf where collections or individual science items may be displayed. Aquaria and terraria are a source of constant interest and provide a place where many important science phenomena may be observed. Simple weather instruments can be made from materials available almost anywhere. Observing the weather changes from day to day is a source of interest and can form the basis for useful science lessons. Small flowerpots placed along a window-sill where there is plenty of light will provide ample space for growing seeds and small plants. If more space is desired for some experiments, shallow wooden boxes may be obtained or made from new or scrap lumber.

1.2.5 Resource persons

In every community there are many resources available to enrich education classes. Use of community resources can take two forms: resource persons can be brought into the classroom or the class can take a field trip into the community. Field experiences and the use of community resource persons can provide students with a diversity of information, materials, and experience not available in any textbook. Key to successful preparation of outside resource persons is integrating their expertise into the lesson. Experts can serve as subject-matter specialists, they can help students prepare for roles in a simulation from the point of view of a working professional, and using their own experiences, resource volunteers can help debrief the activity by comparing the decisions reached by the students with those reached in the real world (http://www.cms-ca.org/orps.htm).

1.2.6 Technology and Community resources

Science materials that enrich the curriculum and provide unique experiences for learners can be sent **through the mail such as** curriculum materials; guidance materials from professional organizations. Internet or e-mail communications can be valuable additions for classes that have internet access. Students communicate by e-mail with other participating schools about various aspects of science and how it affects our society today. Students can perform various experiments, collect information and post their data on the Internet..

II. RESEARCH MODEL

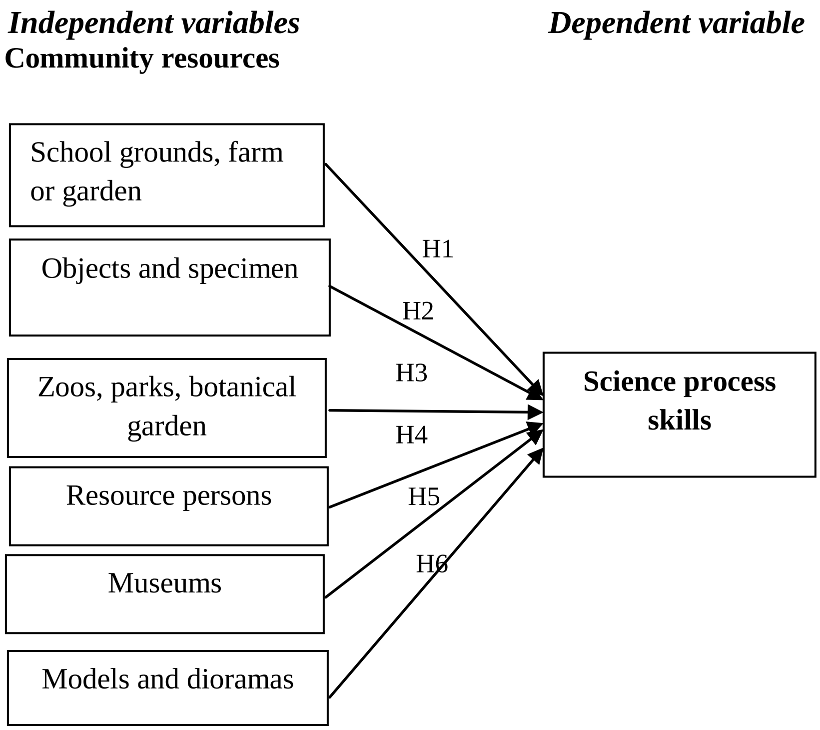

Figure 1. Research model

2.1 Hypotheses development

2.1.1 School grounds farm or gardens

School grounds offer learners a unique opportunity for direct observation of the environment and practical scientific enquiry outside the classroom. This forms the basis for an understanding of the nature of science as well as the acquisition of science process skills. According to Campell, (1988), science can come alive by getting out of the classroom; and that, science that does not make the connection between looking in wonder at the natural world and scientific enquiry is incomplete. School grounds can therefore be useful for outdoor science learning, quite inexpensively, in the relatively non-hazardous environment. Thus the hypothesis,

H_1: Use of school grounds in science teaching positively enhances the development of science process skills in learners

2.1.2 Objects and specimen

Objects are a medium of understanding and appreciation of the complex natural world through direct exposure of natural objects. Objects refer to a collection of real things for instructional purposes. A specimen on the other hand is a sample of the real object or a material. Using objects and specimens enables science teachers to plan their teaching with certain simple and direct observations of the object or specimen being referred to. This enables teachers to ask questions from the students to elicit more details of the features of the object or specimen under observation. Objects and specimen enables teachers clarify and emphasize important structural details of the object or specimen under observation and to also provide review and practice to make learning permanent (NCTM, 1989). Collection of objects and specimens by students requires interaction with others leading to development of social skills and values. Student's power of observation and first hand experiences is enhanced by collection of objects and specimens and can be good source of doing investigatory projects. This arouses some interest among students in learning and involves all the five senses in the process of learning; heighten the reality in the class room and makes teaching lively. Thus the hypothesis

H_2: Use of objects and specimen in science teaching enhances the development of science process skills

2.1.3 Zoos and parks

Zoos and parks according to Rennie and McClafferty, (1995) contain a diversity of terrestrial animals with different characteristics and adaptive mechanisms. These form a very rich source of biological information to both teachers and students. Parks are helpful in teaching students about environmental management and conservation and also in solving problems and preserving the natural world for future generations. Zoos concerned with taking care of endangered species can help students develop and implement management plans. This in turn translates to the development of observation; communication; classification; measurement; inference and prediction skills in students. Thus the hypothesis:

H_3: Use of zoos and parks in science teaching enhances the development of science process skills

2.1.4 Resource persons

Knowledgeable persons from the community can provide new information and experiences to students and link the school to the world outside (Knapp, 1996). The teacher should spend time with the resource persons before the visit so they can discuss the age level of students and kinds of activities and information appropriate for this age group; the needs of the guest during the visit and his or her general comfort level with children; the topic of the presentation and the students' general knowledge about this topic; and what the teacher can do before to make the visit a success. Staff of state agencies can serve as classroom partners or as knowledgeable resource people. For example, staff from a conservation agency might be able to aid schools in setting up an outdoor classroom or civil engineers from the highway department may be able to show plans for a bridge project (Rennie and McClafferty, 1995). Many potential speakers are overlooked, however, because they work in less technical fields. Valuable links to the community as well as connections between school subjects and the workplace may be created by inviting a health worker who could talk about prevention, treatment and management of various diseases. An agricultural officer or the owner of a feed store, are other possibilities. Guests who can come back to the classroom numerous times may enhance the learning experience for the students. Thus the hypothesis:

H_4: Use of resource persons in science enhances development of science process skills

2.1.5 Museums

A museum is a building displaying a collection of historical and biological objects, specimen and and other artifacts of general interest kept for viewing by the public. Museums can be a very useful site for explaining a number of scientific phenomena. They offer students the opportunity to apply and integrate their newfound knowledge in ways that deepen their understanding and create lasting learning (Rennie and McClafferty, 1995). The artistic items in museums can enable students develop science process skills. Museums can be instrumental especially when teaching topics like genetics and evolution as students are able to see how man has evolved through eons of times through the fascinating series of men from small ape-like creatures to the familiar face of modern man, Homo-sapiens (Falk and Dierking, 2002). Teachers need to take advantage of the richness and variety of museums using museum classes, team teaching with museum professionals and problem based learning thus help students develop science process skills.

Thus the hypothesis:

H_5: Use of museums as instructional media in science can enhance development of science process skills

2.1.6 Models and Dioramas

Models are modified real things. They could be manufactured objects or representational objects. Dioramas are generally modified knots with scratch built items added. According to Wittich and Schuller (1979), an object is the real thing whereas a model is recognizable three dimension of a real thing. Models have long been used in the classroom to help students learn important concepts in science, and to hold their attention and interest. Furthermore, students not only understand what they see, but also believe it is real (Manny and Manny, 1992). Use of model organisms includes hands-on-activities that provide unique experiences that could not be obtained with other teaching methods (Rowan, 1991). By working with model organisms, students are able to explore scientific methods and concepts themselves. Moreover, they come to understand the investigative nature of the scientific enterprise, including how conclusions are drawn from data. Models also allow students to explore on their own and reach beyond the scope tackled in the textbooks. This leads to the development of science process skills in students.

Thus the hypothesis:

H_6: Use of models and dioramas in science enhances the development of science process skills

III. METHODOLOGY

3.1 Sampling and data collection

The study resides in a general survey model (Karasar, 1999). Data was collected using questionnaires. Using sample size formula $n = (z_{a/2}\sigma)^2 / E^2$ a total of 385 questionnaires were randomly distributed to form four students in 33 schools. 218 of the questionnaires were collected back of which 28 were incorrectly filled and were not used. The sample size for the study was therefore 186. Data was analyzed by use of descriptive statistics and inferential statistics. Correlation was employed to establish the associations while multiple regressions were used to test the hypotheses of the study.

3.2 Variable measurement

3.2.1 Independent variables

The independent variables were based on factors derived from existing literatures. The questions were modified to fit the context of community resources. A total of 24 statements were developed to capture the six community resources under investigation. Each statement was measured by five-point

Likert scale. For instance, "1" denoted as strongly disagreed, "2" denoted as disagree, "3" denoted as neutral, "4" denoted as agree and "5" denoted as strongly agree.

3.2.2 Dependent variable: Science process skills

The measurements for science process skills were measured using items derived from literature. A total of six questions were used. Each question was measured using five-point Likert scale where; 1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree and 5 – strongly agree.

3.3 Results

Demographic data show that a slight majority of respondents were female: 105(56.5 per cent), to males: 81(43.5 per cent) as presented in table I.

Table I: Demographic data

Gender	Frequency	Percent
Female	105	56.5
Male	81	43.5
Total	186	100.0

Source: *Survey Data*

3.4 Scale reliability

The internal consistency of the research instrument was tested by reliability analysis using Cronbach's α measurements. The reliability coefficients (a) of each independent variable are as follows: school grounds (.752); objects and specimen (0.725); zoos, parks and botanical gardens (0.747); resource persons (0.865); museums (0.866) and models and dioramas (0.777). The reliability coefficients of all the independent variables are above 0.70, which concurs with the suggestion made by Nunnally (1978). The descriptive statistics of the variables and reliability estimates are shown in table II.

Table II: Descriptive Statistics and Reliability Estimates

Variables	**Mean**	**Std. Deviation**	**Cronbach's α**
Science process skills	3.9190	.27475	.746
School grounds	3.998	.2786	.752
Objects and specimen	3.8141	.25897	.725
Zoos, Parks, Botanical gardens	3.7342	.29919	.747
Resource Persons	3.8898	.38873	.865
Museums	3.8273	.28793	.866
Models and Dioramas	3.6624	.44840	.777

Source: *Survey Data*

3.5 Correlation analysis

Since a single construct in the questionnaire was measured by multiple items, the average score of the multi-items for a construct was computed and used in correlation analysis and multiple regression analysis (Wang and Benbasat, 2007). Pearson correlation analysis was conducted to examine the relationship between the variables (Wong and Hiew, 2005; Jahangir and Begum, 2008). As cited in Wong and Hiew (2005) the correlation coefficient value (r) range from 0.10 to 0.29 is considered weak, from 0.30 to 0.49 is considered medium and from 0.50 to 1.0 is considered strong. However, according to Field (2005), correlation coefficient should not go beyond 0.8 to avoid multicollinearity. Since the highest correlation coefficient is 0.506 which is less than 0.8, there is no multicollinearity problem in this research as shown in table III.

Table III: Correlation Results

		Science process skills	School grounds	Objects and specimen	Zoos, parks, botanical gardens	Resource persons	Museums	Models and dioramas
Science process skills		1	.586	.358**	.483**	.506**	.505**	.374**
School grounds		.586	1	.468	.283	.148	.318	.407
Objects and specimen		.358**	.468	1	.278**	.136	.257**	.140
Zoos, parks, botanical gardens		.483**	.283	.278**	1	.143	.120	.232**
Resource persons		.506**	.148	.136	.143	1	.511**	.107
Museums		.505**	.318	.257**	.120	.511**	1	.245**
Models and dioramas		.374**	.407	.140	.232**	.107	.245**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Source: *Survey Data*

3.6 Relationship between Community resources and Science process skills

The use of school grounds, objects and specimens, use of zoos, parks and botanical gardens, resource persons, and museums, exert statistically significant effect on the learners' acquisition of science process skills. The beta coefficient for use of school grounds was .186, t=3.675, p< 0.000. The p-value associated with t-ratio is low, therefore the hypothesis is accepted. There is a statistically significant relationship between use of school grounds and acquisition of science process skills. The beta coefficient for use of objects and specimen was .140, t=2.610, p< 0.010. Due to the low p-value associated with t-ratio, the hypothesis is accepted. Therefore there is a statistically significant relationship between use of objects and specimen and acquisition of science process skills. The beta coefficient for zoos, parks and botanical gardens was .330, t=6.156, p< 0.000. Since the p-value associated with t-ratio is low, the hypothesis is accepted. Therefore there is a statistically significant relationship between use of zoos, parks and botanical gardens and acquisition of science process skills in students. The beta coefficient for use of resources persons was .302, t=5.162, p< 0.05. Due to the low p-value associated with t-ratio, the hypothesis is accepted. Therefore there is a statistically significant relationship between use of resource persons and acquisition of science process skills. The beta coefficient for use of museums was .229, t=3.745, p< 0.000. Since the p-value associated with t-ratio is low, the hypothesis is accepted. Therefore there is a statistically significant relationship between museum classes and the acquisition of science process skills. Finally, the beta coefficient for use of models and dioramas is .190, t=3.585, p> 0.000. Since the p-value associated with t-ratio is low, the hypothesis is accepted. Therefore there is a statistically significant relationship between use of models and dioramas and acquisition of science process skills in students. This is illustrated in table III.

Table IV. Relationship between community resources and science process skills

Variables	Beta	*t- value*	*P- value*
(Constant)			
School ground, farm or garden	.186	3.675	.000
Objects and specimen	.140	2.610	.010
Zoos, parks, botanical gardens	.330	6.158	.000
Resource Persons	.302	5.162	.000
Museums	.229	3.745	.000
Models and dioramas	.190	3.585	.000

Notes: *R^2 =.549, F=43.74, Sig. F=.000*

Source: *Survey Data*

IV. DISCUSSION

Out-of-classroom activities lie at the heart of the scientific enterprise. Pure logical thinking cannot yield any knowledge of the empirical world; all knowledge of reality starts from experience and ends in it. These calls for renewed encouragement to teachers to inspire many students learn science in their natural environment. There is clear evidence from this study that use of community learning resources, which characterizes much outdoor teaching, does help learners develop science process skills. It also helps to motivate and inspire students who may otherwise be sidelined by a more formal classroom situation. In the related studies, hands-on learning and teaching activities encourage accurate observation and description by science learners (Lynch & Ndyetabura, 1983; Gayford, 1988; Swain, Monk & Johnson, 1999; Kocakülah & Kocakülah, 2001). The results of the related studies are in line with the findings of the current study. Science in science museums, zoos, parks and botanical gardens is often seen as exciting, challenging and uplifting. Out-of-classroom contexts can add to and improve the learning of science in several ways Braund and Reiss, (2004). They can promote the understanding and integration of science concepts. Falk and Dierking, (2002) have reviewed studies that show that science museum visits can lead to improved understanding of such classic school science concepts as evolution, an improvement measured by tests of knowledge before and after visits. They are also an opportunity to engage in science activities that would not be possible in the school laboratory either because of safety considerations or because they are too complex and they can provide access to rare material and to ‘big’ science. Science museums, botanic gardens, zoos and science industries provide opportunities for students to see yesterday’s and today’s science in use. Artifacts and collections, and the stories associated with them; help teach about the ways in which scientific and technological knowledge has been generated and about the social enterprise in which those who engage in this work operate. Such activities also provide opportunities for science activities which are less constrained by school bells and lesson times. Work can be more extensive and there are more opportunities for students to develop science process skills and take responsibility for themselves and others, to work in teams and to consider their effects on the environment. Taking these results into consideration, it can be said that community resources are very instrumental in science instruction and hence in the acquisition of science process skills.

V. CONCLUSION

Imagination and creativity in using community resources can help students connect school science with applications in the community, as well as helping students better learn basic science process skills and concepts. Students learn science from many sources, in a range of different ways, and for a variety of purposes. Teachers are encouraged to explore further learning opportunities available in the community and make good use of them to make science learning and teaching interesting, authentic and meaningful. The outdoors has such a lot to offer science teaching, quite inexpensively during normal timetabled lessons. Learning activities can therefore be incorporated into science classes as a series of short episodes of outdoor activity over a period of time. Taking students to a science museum, zoos, parks, botanical gardens or out onto the school grounds, exposing them to innovative materials, or inviting guests who can give unique insights are a few ways to increase their learning experiences hence development of science process skills. School management should support the use of community resource by allowing students to go for out-of-classroom activities and closely monitoring their full participation. Seminars and workshops should be organized for teachers to share experiences on designing learning activities and hands-on exploratory activities. Parents are also encouraged to support out-of-classroom learning activities by cooperating with teachers and school administration, and allow their children to go for field trips when requested to do so. Teachers and school administration should on the other hand assure parents of the learners' safety and take necessary measures to ensure the learners are safe.

VI. LIMITATION AND FUTURE STUDIES

This research was conducted in selected secondary schools in Kenya and whether the results from this research would be consistent with other countries' schools need to be verified through further research. Future studies can focus on conducting a multi-country comparison to test the influence of moderating factors such as the national culture from the countries. The future research should follow the longitudinal approach to predict beliefs and behavior over time since the model is this study is cross-sectional, which measures the intention only at a single point in time (snapshot approach) (Luarn and Lin, 2005). This study focused on students in their fourth year of study. Thus, it is possible that results taken from a different year or from teachers might have different result. It would therefore be useful to make a comparison study between teachers and students in future study. The result from this study could be due to the skills obtained from other teaching experiences for example, lab practicals. Therefore, future study can also do a comparative study to investigate if there are any differences in the acquisition of science process skills from other experiences and compared with use of out-of-classroom activities. Research challenges for out-door activities like student safety could also be looked at.

Although out-of-classroom contexts are valuable for learning in science Gilbert and Priest, (1997), there is much about them that is under-researched (Rickinson, et.al, 2004; Osborne, 2006)). Further research is needed into the long-term impacts of out-of-classroom learning in science and attitudes to science; how the formal and informal learning sectors can complement one another to maximize their joint contribution to students' development of science process skills; how out-of-classroom contexts can engage with the full range of students of school age; how school grounds can be used to improve learning in all the sciences, not just biology; and the particular worth of residential activities. The further studies which will be carried out on identifying science teachers' opinions and attitudes towards use of community learning resources in enhancing science process skills can be obtained through structured-interviews both with teachers and students, and observation during plasticizing experiments and analyzing worksheets and reports of students for more detail findings. The further studies should be conducted on this conception and this will shed light on the issue in details. Various studies' results have showed that females' attitudes towards aims of science activities and science lab were higher than those of males (Ekici, 2002), the reasons of this finding should be examined. Teachers' attitudes towards use of locally available resources should be established hence subsequent well-developed in-service teacher training seminars for these teachers. Additionally, pedagogues and academicians should inform the teachers about the aims, new approaches and innovations in science instruction and provide them with rich written resources (Ayas, Çepni & Akdeniz, 1994), and increase their interests and desires towards in-service seminars.

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