Locally Available Resources as an Instructional Aid in Secondary School Science in Kenya

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***Abstract:-*Science is a practical subject that is relevant to all our lives. Instructional methods employed by science teachers are to a very large extent influenced by the kind of resources and facilities available in the school. The instructional methods, in turn, influence the level and quality of participation and performance in science by students. The study sought to identify the LAIRs, to find out if these LAIRs are used by the science teachers and to determine the relationship between availability and use of LAIRs by the science teachers. The study was carried out in Uasin-Gishu County, Kenya. A sample of 33 biology teachers was randomly selected from 109 selected schools in the county. The major purpose of the study was to survey the nature and extent of LAIRs in Uasin-Gishu County which are useful in improving science teaching. Descriptive research design was used in this study. Data was collected using questionnaires, observation schedules for biology lessons and observation checklist. Data obtained was analysed using SPSS. Pearsons' product correlation was used to determine the relationship between variables. Results indicated inadequate use of LAIRs in science teaching. This is attributed by teachers not being aware of the rich curriculum laboratory offered by the schools' immediate environment. The other reason is due to large content to be covered within a specified time and also the highly examination oriented teaching. Pearson correlation 'r' value, (0.502) with a P value < 0.05 implied a significant positive relationship between availability and use of LAIRs. It is therefore recommended that science teachers undergo in-service training programs on use of LAIRs in schools as this will greatly impact on the acquisition of science process skills by students and improve the overall performance of science as a basis of future science oriented careers.**

Key words: **Science teaching, locally available instructional resources, Instructional methods, Performance**

I. INTRODUCTION

For students to understand scientific concepts, they need to learn practical skills and be able to make connections between the science that they learn in school and their everyday lives. In general, where resources and facilities including teachers, textbooks, laboratories, chemicals, tools and equipment, teaching aids, stores, offices are inadequate, the teaching approach tends to be teacher-centered. To combat this practice, it is necessary that educators think more of the potentialities in using locally available instructional resources (LAIRs) as a laboratory for learning. Trying to teach science without access to resources can be very challenging, even for experienced and knowledgeable teachers (TESS, 2015). The primary purpose of education is to ensure effective individual student participation in the learning process. This type of approach heavily relies on teachers' creativity because most secondary schools in Kenya are faced with the challenge of lack of conventional instructional resources. This results to science lessons being dominated by the teacher as he or she lectures on the subject, gives notes and demonstrates the practical aspects of the lesson (Mochire, 2010). The students remain passive participants expected to listen and observe only. The teacher, therefore, is the sole source of knowledge for the pupils. This can be risky in the event that the teacher is inadequately informed on the subject or is not adequately trained in the art of communication. A teaching approach that centers on the teacher is bad for science teaching and learning and soon kills the interest of students in the subject. Good science teachers are resourceful. Even if they do not have access to scientific equipment, they can improvise and make use of LAIRs in order to teach science. They will also think about the learning environment in their classroom and how to make links between scientific ideas and students' lives. Trying to teach science without access to resources can be very challenging, even for experienced and knowledgeable teachers (TESS, 2015).

The use of LAIRs will enable science teachers deploy methods that center on the learner thereby encourage students to become active participants in lessons and make learning more real and meaningful. Teachers need to find ways of engaging and motivating the students, and relating the body of science knowledge in the textbook to their lives. If students are motivated and interested then they will learn more effectively. The local school community according to Cook (1938) is a particular type of spatial group plus its culture, an "activity circle" which embraces the inhabitants of an area and fractions in a specific manner and always involves some form of life. Using the community lab can enrich the curriculum from community resources, build community understanding of the school, meet new community needs and increase adventure in school-community coordination.

Bottrell (1960) defines locally available resources are an those persons, places, things, materials, activities and experiences in the community considered helpful in educating our boys and girls into useful, effective, intelligent, participating citizens. The use of LAIRs provides a shared memory for the class **(**Fall, 1996). The local community should therefore be considered, along with the science books, visual aids, experiments and other instructional materials, as an integral part of the all-round education of children. The teacher helps to bring the community and school program closer together

and is a connecting link between the scientific agencies of community, the nation, and the children in their classroom. By using the "community as a classroom," teachers can improve knowledge retention, skill acquisition, and preparation for adult life because students can be given more opportunities to apply learning in practical, real-life settings. This helps develop stronger relationships between the school and its local community, while also increasing the community's investment in, understanding of, and support for the school and the learning experiences it provides (GER, 2014).

Biology is the natural science that studies life and living organisms' structure, function, growth, origin, evolution and distribution in the environment (Bagley, 2017). The world within us, around and above us, in any part of the globe, provides an inexhaustible supply of phenomena, which can be used as subject matter for biology teaching (UNESCO, 1978) that no single biology teacher needs to teach without media resources. Bottrell gives three steps that are involved in using local community resources in teaching as finding the resource or- exploration, arranging them for use in teaching and learning situations - or organizations and using them in appropriate ways in planning and carrying on teaching and learning experiences and activities - or utilization. Teachers can use locally available resources in teaching by taking pupils to where the resources are in the community, and by bringing the resources of the community into the school. Use of LALRs involves careful follow up evaluation to determine their contribution of the purposes for which they are used, and to discover the most appropriate ways in which to make future use of them.

LAIRs include ponds, swamps and rivers, pasture and grazing land, cultivated fields, abandoned land, forest areas, creeks, sand pits, playgrounds, swimming pools, nature trails, bird sanctuaries, objects and specimen, markets and health centers, resource persons, zoos and parks, museums among others. The schools' immediate local environments have access to a range of natural resources that can support the teaching of science. These resources can be collected from the outside environment like objects such as leaves, spiders, plants, insects, rocks or wood and used in the classroom. Bringing these resources in can lead to interesting classroom displays that can be referred to in lessons. Teachers can invite resource persons from the community for example doctors to talk about diseases, how they are spread or acquired and preventive measures. The outside environment can also be used as an extension of the classroom by taking students out of the classroom to observe natural phenomena. There is usually more room to move outside and for all students to see more easily when they are taken outside to learn.

Despite this rich supply of materials in the community, students have continuously performed poorly over the decades in biology in Kenya (MOE, 2018). A study by Ong'amo (2014) revealed that teaching and learning resources were not adequately used in biology in Kenya and this in turn affects students' academic achievement. Ngesu et. al. 2014 cited practical sessions as one the major ingredients of good performance in Biology. LAIRs if used effectively can support student learning and increase student success by allowing the student to explore and experience knowledge. Doing practical work using LAIRs is one way to help students become actively involved in the learning process.

Purpose of the study

The main purpose of this study was to survey the nature and extent of resources available in Uasin-Gishu County which are useful in improving science teaching.

The objectives of the study were:

- To identify the LAIRs in Uasin-Gishu County that can improve science learning
- To find out if the LAIRs are used by the science teachers in the county
- To determine the relationship between the availabity and use of LAIRs by the science teachers of Uasin-Gishu County.

Research Questions

The study sought to seek answers for in the following research questions:

- To what extent are certain LAIRs available in Uasin-Gishu County?
- Are the LAIRs used by the science teachers in Uasin-Gishu County?
- What is the relationship between the availabity and use of LAIRs by the science teachers of Uasin-Gishu?

Research Hypothesis

One research hypothesis was formulated and tested,

HO1. There is no significant relationship between availability and utilization of LAIRs in science teaching.

Scope of the study

The study was carried out in Uasin-Gishu County, Kenya. A sample of 33 biology teachers was randomly selected from 109 selected schools in the County.

Sample and Sampling Techniques

The target population of this study consisted of all secondary school biology teachers in Kenya. The 109 schools in Uasin-Gishu County were purposively grouped into their respective categories as Public and Private schools. A sample of 33 biology teachers was randomly selected from the two strata to constitute 30% of the total population.

II. RESEARCH DESIGN AND INSTRUMENTS

The Descriptive-Survey design was used in this study. A biology teachers' questionnaire was designed and used to collect data for the study. An observation schedule for biology lessons used to obtain data on actual classroom use of

LAIRs. An observation check-list was also used to identify the available resources that can be used in science teaching. The instruments were validated by experts in the school of Education, University of Eldoret.

Procedure for Data Collection

A letter authorizing data collection from the national commission of science technology and innovation was sent to the sampled schools requesting for their involvement in the study. Ethical issues on the participants were assured including anonymity. The researcher personally administered the questionnaires to the sampled in Uasin-Gishu County. Copies of the questionnaire were given to the respondents who were given a duration of one week to go through carefully and respond to the items therein. The questionnaires were picked by the researcher and at the same time an observation checklist identity the LAIRs. Actual observation of biology lessons was done to ascertain the resources utilized by science teachers in instruction.

Data Analysis Technique

Descriptive statistical method was employed in collecting and analyzing data generated by finding the percentage. The data derived from the questionnaires -were assembled into appropriate tables, as indicated by the purpose of the research. Pearsons' product correlation was used to determine the relationship between variables.

III. RESULTS

Findings from the study indicate that LAIRs for science instruction were generally available to the respondents though in varying degrees. The respondents agreed that LAIRs including ponds, swamps and rivers, pasture and grazing land, cultivated fields, abandoned land, forest areas, creeks, sand pits, playgrounds, swimming pools, objects and specimen, markets and health centers, resource persons, zoos and parks, museums are readily available within the schools' local environment. Despite the fact that most of the LAIRs specified in this study are available in Uasin-Gishu County, data obtained indicates that teachers do not use them exhaustively in instruction (M=3.104, SD=.9045). Insufficient use of teaching resources in science has also cited by (Mochire 2010) who says that science teachers continue to teach science using the lecture method despite the recommended guided discovery/inquiry methods and the acceptance of these methods by teachers at organized training and orientation courses. Biology teachers who constituted the respondents in this study do not adequately use the LAIRs which are available to them.

About 84% respondent agreed to statement that LAIRs if used can promote teaching and learning of science (M=4.39, SD=.682). 44% of the participants said they include LALRs in the lessons to make students participate in learning (M=3.08, SD=0.768). More than half of the respondents 63.5% agreed that using LAIRs would cater for students' individual differences (M=3.72, SD=1.152). A good percentage 76% stated that they would try to incorporate LAIRs as instructional strategy, method and technique as a means of trying to meet the students learning needs (M=3.981, SD=.708). 70.1 % agreed that they ask questions to assess what students have learnt from use of LAIRs (M=4.26 SD=.806). About 100% the participants agree use of LAIRs develops students' skills in observation, measurement, and in data and specimen collection (M=4.91, SD=.446), and promotes learning through use of first hand real life experiences (M=4.30, SD=.458). Almost 91% of the respondents thought that use of LAIRs develops good working relations amongst students (M=4.42, SD=.808 and help link what they learn in class and practical science (M=4.27, SD=.417).

One aspect of modern science education philosophy and objectives emphasizes direct and resource contact, insofar as possible, with the resources of the environment or universe. Since these respondents do not adequately utilize the available LAIRs for such direct contact with the resources in their environment creates a variance with such a modern approach to science education. This could be attributed to incompetence in resource use, or that teachers are so insulated from the LAIRs to such extent as to not be sensitive to their potential and real aids to science teaching.

Factors in the teaching-learning situation in Uasin-Gishu County are of such nature as to make it difficult and/or impossible for science teachers to utilize LAIRs as instructional aids. The factors cited by respondents include large class sizes, less time allocated on the timetable and flexibility which dictates movement to and from resource areas and wide curriculum content that needs to be covered in specified durations. It is therefore possible that these teachers do not adequately use the LAIRs because of the inconveniences involved in making the arrangements for the use of the resources. The teachers are also oriented towards their textbooks and prescribed approaches and content of science as to not be aware of or concerned with LAIRs that can be used to promote science teaching and learning.

Data obtained from observation schedules indicated that teachers lack creativity, initiative and/or imagination which blind them to the myriad of LAIRs in the school's surroundings that can be used as instructional resources in science. Most observed lessons were spirited in the entrenched culture of dictating or writing notes on blackboards. Teachers were observed struggling to draw sketches of plants or animals on the board as illustrations for the class, when they could quite easily obtain these resources from the school surroundings. In the production of textbooks or teachers' notes examples to be used for demonstration in class should provide instances of the use of everyday readily available materials.

Correlation Statistics

Study hypothesis: There is no significant relationship between availability and utilization of LAIRs in science teaching.

Table1: Pearson Product Moment Correlation of availability and utilization of LAIRs in science teaching.

Table 1: Correlations

Variable	N	M	SD	Availability of LAIRs	Use of LAIRs
Availability of LAIRs	33	4.61	.872	1	.502**
Use of LAIRs	33	4.01	.983	.502**	1

P < 0.05 (**= Result is Significant at 0.05 level)

The result in table 1 showed that 'r' value, (0.502) with a P value < 0.05 implies a significant positive relationship. The null hypothesis is therefore rejected, which means that there is significant relationship between the availability and use of LAIRs in science instruction.

IV. CONCLUSION

Many LAIRs can be used in teaching, not just textbooks. These resources if used you will appeal to the different ways that students learn using different senses (visual, auditory, touch, smell and taste). LAIRs are all around us and can be used in the classroom, and that could support students' learning. Any school can generate its own learning resources at little or no cost. By sourcing these materials locally, connections are made between the science curriculum and students' lives. Using local experts and natural resources from the schools' immediate environment who have expertise in a wide range of topics can help create links with the local community, demonstrate its value, stimulate students to see the richness and diversity of their environment, and perhaps most importantly work towards a holistic approach to student learning that is, learning inside and outside the school.

V. RECOMMENDATIONS

It is recommended that;

1. The schools in their educational programs to incorporate a more effective use of all educational resources in the community, whether physical, natural or human. One way in which this can be done is by having an in-service program of resource-based instruction education for administrators and teachers in Kenya.
2. The science teachers be provided with information about all available resources, attend conferences, workshops to strengthen their instructional processes which may be weak because of inadequate prior training on resource-use education and its implications for science education.
3. Teachers be motivated to create individual and/or group interest and competence in the use of resources to improve science teaching.
4. Teacher training institutions consider further integration of resource use approaches in their education methods and science education courses as well as utilize LAIRs during the pre-service education of teachers.
5. Teachers be encouraged to improvise simple laboratory equipment using locally available materials so as to sustain activities in a laboratory

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