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The Role of Teaching and Learning Aids in Learning Science Subjects: A Case Study of Morogoro Municipality, Tanzania

Badaka Kija[1], Dr. Benedicto William Msangya[2*]

[1]Department of Education, College of Science and Education, Sokoine University of Agriculture, P.O. Box 3038, Chuo Kikuu, Morogoro, Tanzania
[2]Department of Education, College of Science and Education, Sokoine University of Agriculture, P.O. Box 3038, Chuo Kikuu, Morogoro, Tanzania
* E-mail of the corresponding author: benemsa528@gmail.com

Abstract: **The process of teaching and learning depends upon the use of different types of equipment available in the classroom. Reformers are suggesting that teachers should utilize inquiry based and student centered instructional practices that will facilitate students' construction of knowledge. The main objective of the study was to examine the role of teaching and learning aids for science students in the secondary school. A qualitative research methods approach using semi-structure questionnaires was carried out from four secondary schools (Mafiga, Kigurunyembe, SUA and Educare secondary schools). The results revealed that the use of teaching and learning aids/models has high influence on students' performance through assessing the responses of students in which most of them said that learning by using teaching and learning models/aids helped in arousing interests, motivate them to learn, create attention, improve motor performance and improve retention of memory. The findings from teachers revealed that the use of teaching and learning models/aids in teaching science subjects enabled them to teach systematically, explain difficult concepts clearly and serves time when teaching in classes which are overcrowded.**

Keywords: **Teaching, Learning Aids, Secondary School, Tanzania.**

1. INTRODUCTION

The effectiveness of teaching and learning depends upon the use of different type of equipments available in the classroom. There are many Traditional and Modern teaching and learning materials available these days, they are of much importance in TLP (Teaching Learning Process**).** As we all know that today's age is the age of science and technology. The teaching learning program has also been affected by it. The process of teaching - learning depends upon the use of these different types of equipment available in the classroom. Science education is the focus of many reform efforts, specifically reformers are suggesting that teachers utilized inquiry based and student centered instructional practices that will facilitate students' construction of knowledge. Curriculum materials designed to address teacher learning as well as student learning is one potential vehicle (Ball & Cohen, 1996).The rationale of observational learning is based on Bandura's (1994) social learning theory; it explains learning as a continuous interaction between cognitive, behavioural and environmental influences. For effective learning using teaching and learning materials, several conditions need to be fulfilled; students need to pay attention to relevant elements in the learning environment, store and transform information in memory and to be able to translate mental conception in actions and be motivated to do so .Observation is a first step in the learning Process.

Until recently many theories of teaching took little account of the results of research on learning processes (Duffy, Lowyck & Jonassen, 1993). In many instructional theories, the teacher is the directing agency, who prescribes to a high degree what learners should do to realize the objectives presented by the teacher. This view of teaching, which is founded on the idea that teaching essentially comes down to the transmission of knowledge from an external source to the learner, has come under increasing pressure (Biggs, 1996).

Brown, Collins and Duguid (1994) noticed that teaching often leads to isolated and inert knowledge. According to them, knowledge domains acquired through education are often studied in isolation from one another and are therefore difficult to access. Inertness of knowledge refers to the problem, also known in working practice, that, although pupils and students have indeed acquired a lot of knowledge, they may not have acquired the capacity to apply this knowledge to solve problems in practice. Teaching practices and theories of teaching should base on knowledge, and theories of how students learn already are found in Gagne's work (Gagné, 1997). More recently, Glaser (1995) and Shuell (1996) again made a taking in already existing external knowledge, the role of teaching changes too, from transmission of knowledge to supporting and guiding self-regulated knowledge construction (Lonka, 1997).

The processes of students' knowledge construction become the object of teachers' efforts. These calls for theories of teaching that are firmly based on an analysis of student learning processes (e.g. Duffy *et al.*, 1993; Brown, 1994; De Corte, 1995). The distinction between cognitive, affective/motivational and psychomotor components of learning can also be found in the work of several other researchers, e.g. Short and Weisberg-Benchell (1998)and Wagner and McCombs (1995). Therefore, a first organizing principle in the categorization of learning activities presented below concerns three types of learning activities: cognitive, affective and psychomotor.

This study is imbedded in the contributions of teaching and learning materials/ aids to student's performance in Tanzanian secondary school. One of the challenges facing the current secondary schools in Tanzania is poor performance in science subjects. This Performance tends to differ among students, those in private or government schools which are well established/ equipped and those in ward Government secondary schools/which are not well equipped especially in science subjects. Schools which use teaching-learning aids /models during classroom instructions performance in science subjects especially Biology and Physics are encouraging compared to schools which do not use models or teaching aids during classroom instruction performance is not encouraging, however it is hardly known if performance differences is associated with the use of models or teaching aids during classroom instruction .Therefore this study seeks to investigate on the role of teaching- learning aids during class instruction.

The findings of this study will help the Ministry of education and vocational training to formulate policy to identify the importance of using observational Aids/models in teaching science subjects. School administrators will be encouraged to put more emphasis on the use of teaching and learning Aids/models in their schools so as to arouse student's interest and to learn science subjects. Subject teachers who will become successful in the use of teaching Aids/ models, their work of delivering subject matter will be effective and efficiency in the teaching profession.

2. MATERIALS AND METHODS

The study was conducted in Morogoro Municipality, Tanzania. The total sample size was 68 respondents (48 students and 20 secondary school teachers). The study was done in four secondary schools namely Mafiga secondary school, Kigurunyembe Secondary school, Sua secondary school and Educare secondary school. The study was a cross-sectional research design which allowed the collection of data from different groups of respondents at relatively the same time. The study is descriptive in nature because it asked 'what' questions. Both the qualitative and quantitative approaches to research were used, but the qualitative approach was largely employed. The quantitative approach had been used for purposes of analyzing quantitative data such as socio – demographic characteristics and compiling simple statistics, while qualitative approach was used to capture students and teachers' responses.

3. ETHICAL ISSUE

As to the ethical issue the following ethical and moral concerns were addressed; harms and benefits were assessed for the wellbeing of research participants, informed consent were secured (participant understanding of what it means to participate in the study were ensured), privacy and confidentiality were kept (participants' identities and the data were protected).

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4. RESULTS AND DISCUSSION

4.1 Availability of teaching and learning models/aids

The study found that teaching and learning models/aids in most secondary school in Morogoro municipality were limited in supply, although 47.9% of students agreed that teaching and learning materials/models were available in their schools. But 52.1% of students said that teaching and learning materials/models were not available in their schools, which implied that availability of teaching and learning models/aids were limited in supply to the extent that some variations in performance could occur. The same study was done by Valerie Emblen (2011), on Teaching Practice and Learning Outcome In Grade 3, in Bokeo Province Educational Standards and Quality Assurance Center Ministry of Education in Vientiane and found that teachers attempted to use new methods, while the effectiveness and efficiency was low, because of inexperience, insufficient preparation time and lack of teaching and learning materials the most important factor causing low performance on active learning is that teachers could not comprehend the meaning or philosophy of the active learning; they just remember the formats or patterns of implementation.

Table 1: Below shows the responses from students on the availability of teaching and learning models/aids (students=48 respondents).

Response	Frequency	Percent
Yes	23	47.9
No	25	52.1
Total	**48**	**100.0**

4.1.1 Responses from Teachers

Teachers revealed that teaching and learning models/aids in their schools were limited in supply, though appreciated on the roles played by teaching and learning aids/models in learning and teaching science subjects. Teachers response strived to support teaching and learning processes with instructional materials. They improvised relevant materials that enabled them in explaning concepts when teaching science subjects. However, many teachers could not catch the objectives of curricula; some had never seen the models for particular subjects like Biology and Physics in their respective schools. Many teachers encountered difficulties on teaching science subjects.

4.2 Usability of teaching and learning models/aids

The study found that there was a minimal use of teaching and learning models/aids when teaching and learning science subjects in Morogoro municipal secondary schools.

The findings revealed that 18% of students said that teaching and learning materials/models were not used at all during teaching and learning processes, the findings showed that 37.5% of students said that always models were used during teaching and learning processes while 43.8% of students said teaching and learning models/aids were rarely used in teaching and learning science subjects' especially Biology and Physics. This meant that teachers rarely used models/teaching aids when teaching science subjects as a result variations in performance occurred. Woolnough (1994) also notes that if students are motivated and taught by using variety of teaching and learning aids/models, they will find an appropriate ways of learning.

Table 2: Models/teaching aids are used to teach physics and biology in our school

Response	Frequency	Percentage
Not at all	9	18.8
Always	18	37.5
Rarely	21	43.8
Total	**48**	**100.0**

4.2.1 Responses from Teachers

Findings from the teachers revealed that not all the time teachers used teaching and learning aids/models when teaching science subjects because of overcrowded classrooms, heavy teaching load, and insufficient preparation time, many responsibilities such as being the teacher on duty and even the preparation of teaching and learning models/aids by using the locally made materials. It was always difficult and time consuming, though teachers helped students in explaining concepts and to some extent spent most of their time being closer with their students such that students could understand the lesson taught.

4.3 Teaching-learning aids/models help in arousing interests, create attention, improve retention and help motor reproduction/performance of students.

The results revealed that learning by using teaching and learning models/aids helped in arousing interests, create attention, improve motor performance of students and improve retention of memory. The findings from table 3 below showed that 35.4% of students said that teaching-learning aids/models did not help them in arousing interests, create attention, improve retention and help motor reproduction/performance of students, 2.1% did not respond to the question and 62.5 % of respondents said that learning science subjects using teaching and learning models/aids helped in arousing interests, create attention, improve retention of memory, build self confidence, curiosity, creativity, self discipline and helped motor reproduction/performance of students.

The results indicates that there was a greater need of teachers to employ teaching and learning models/aids when teaching science subjects so as to motivate students to learn and improve performance of students. The related study was done by Gonick, L. and Huffman, A. (1990), on The *Cartoon Guide to Physics* in New York. He observed that concept cartoons are consistent with the model of generative science in teaching. They appeared to provide a powerful stimulus to learners to focus their attention on constructing meaningful explanations for the situations described in the drawings. In this way they promote the active engagement of the learner, which is a vital part of the learning process.

Table 3: learning by seeing models is interesting and it arouses interest to learn

Response	Frequency	Percent
True	30	62.5
False	17	35.4
Missed	1	2.1
Total	**48**	**100.0**

4.3.1 Responses from Teachers

The findings revealed that teachers who used teaching and learning materials/models appeared to provide a powerful stimulus to learners in order to focus their attention on constructing meaningful explanations for the situations described in the drawings. In that way they promote the active engagement of the learner, which is a vital part of the learning process.

5. CONCLUSIONS

Teaching and learning aids are an integral component in any classroom. Benefits of teaching and learning aids include helping learners improve reading comprehension skills, illustrating or reinforcing a skill or concept, differentiating instruction and relieving anxiety or boredom by presenting information in a new and exciting way. Teaching aids also engage students' other senses since there are no limits in what aids can be utilized when supplementing a lesson. As students are reading less and less on their own, teachers are finding reading comprehension skills very low among today's students. Teaching aids are helping teachers to close the gap and hone the reading comprehension skills of their students. Using magazine and newspaper articles, prints ads and even comic books are viable teaching aids that assist in helping students comprehend text. Teaching and learning aids prove to be a formidable supplement for teachers when the reinforcement of a skill or concept is necessary. Not only do they allow students more time to practice, but they also present the information in a way which offers students a different way to engage with the material.

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