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Teacher Preparedness in Use of Instructional Media and the Quality of Learning Outcomes in Biology Theory in Public Secondary Schools in Mwala Sub-County, Machakos County, Kenya.

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ABSTRACT

The study sought to explore the effect of teacher preparedness in use of instructional media on the quality of learning outcomes in Biology theory in public secondary schools in Mwala Sub- County. The study was guided by multimedia learning theory by Richard Mayer. The theory postulates that deeper learning can occur when information is presented in both text and graphics than graphics alone. It hinges on the presumption that there are two channels for learning: auditory and visual. The study adopted mixed method methodology and descriptive survey research design. The target population of the study was all public secondary schools, all teachers of Biology, all heads of Science Department and all form two students in Mwala sub-county. Stratified Random Sampling was used to sample 6 schools; two extra county schools, two county schools, and 2 sub-county schools. Purposive sampling was used to select 6 Heads of Science Department from the 6 sampled schools. One form two stream was randomly sampled for schools with more than one stream. A total of 240 students were selected randomly to participate in the study. Questionnaires and interviews were used as data collection tools in the study. Data was analysed qualitatively and quantitatively with the help of the Statistical Package for Social sciences version 27. Results of the study indicate that teacher preparedness in the use of instructional media has an influence on the quality of learning outcomes in Biology theory. The study established that in Mwala sub-county secondary schools, Biology teachers were not well prepared in teaching using instructional media, and schools had challenges in

acquiring these media due to resource constraints. The study recommends that the government should increase resource allocation to the public schools, and address inequalities experienced in access to resources to equalise resource allocation.

Keywords: Teacher Preparedness, Learning Outcomes and Instructional Media

INTRODUCTION

Utilization of Instructional Media in Learning Science

Media in Education is a new area of interest for specialists in the field of education and communication (Lincy, Thanavathi & Thoothukudi, 2014). Media is instructional and recreating and holds students' attention hence can be used as teaching aids. The use of media in teaching and learning will give information and activate sensory organs. Instructional media is a vital tool for the teaching-learning process. The utilization of instructional media in teaching and learning stimulates students learning outcomes thus improving students' interest and academic performance in class activities (Henry, 2017). According to Adenle (2014), the use of instructional media is of importance for the teaching and learning of the basic sciences in primary and secondary schools, as it drives home the lesson point of the subject being taught and reduces stress for both teacher and student. The use of well-planned instructional media will enhance students' performance in science subjects; including Physics, Chemistry, Biology and Mathematics.

Educationists generally agree that there exists a practical and theoretical shift of emphasis towards acknowledging the fact that instructional media remains the key to effective teaching/learning of chemistry concepts which are perceived to be abstract and symbolic. (Ibrahim,2019). To help students understand Chemistry, researchers have suggested a variety of instructional approaches, such as adapting teaching strategies based on the conceptual change model (Wu, Krajcik, & Soloway, 2001). The ineffective use of instructional media will reduce the effectiveness of the learning process and make Chemistry lessons boring and abstract. According to Koko (2016), although the adequacy of instructional media is to ensure its effective use, the few available instructional materials can be used effectively to boost teaching and learning. Ehirim (2020) recommends that, the utilization of media resources by teachers should be made compulsory in the teaching and learning of all topics in Chemistry at our senior secondary schools, and this must be enforced through periodical monitoring by the school authority. He added that, the Government should provide funds to motivate teachers as regards improvisation and should organize seminars, workshops, and conferences for Chemistry teachers on how to improvise and make effective use of instructional materials in the teaching and learning of Chemistry. The use of instructional media will make learning interesting and help learners capture Chemistry concepts easily hence it should be encouraged in teaching and learning.

According to Chukwudi et al., (2022) one of the reasons why many students perform very poorly and below expectations in Physics is that the schools lack relevant instructional media. The teaching of Physics must focus on making teachers competent at using technology to promote strategies that enable the integration of technology. Adcock & Bolick (2011) state that teaching and learning Physics supported by information and communication technologies offers an alternative to the solutions used in the traditional approach. Instructional media has an emotional impact on Physics students and affects their attitude toward learning.

National Research Council (2000), states that instructional media is used in concert with teacher-directed instruction. Instructional media can help learners in practicing the visualization of a problem. It can motivate learners to explore Mathematics by showing them the value of Mathematics in careers. Instructional media can also model positive student and teacher behaviour. Nyawira (2015) states that abstract Mathematical concepts are made concrete when students see and do some activities using real objects like models hence its essential to utilize instructional materials in teaching. Biology as a science subject becomes very difficult for teachers to teach effectively without the use of appropriate educational media (Ntukidem,2020). Thus, it is important for teachers to properly select and use instructional media to enhance students' outcomes in Biology. A study carried out by Ong'amo et al., (2017) on the Extent of the use of Biology instructional resources and their effect on students' academic performance in secondary schools, found out that students frequently taught using resources performed better than those rarely taught using the resources. The present study aims to find out the influence of utilizing instructional media in teaching and learning Biology theory.

Teacher Preparedness in the Use of Instructional Media and the Quality of Learning Outcomes in Biology Theory

Teacher preparedness is defined as the degree of confidence the teacher has in his or her ability to deliver content to learners. Teacher preparedness refers to the collection of knowledge, attitudes, and skills presented by teachers to enhance education outcomes (Ondimu ,2018). Preparation for teaching will include lesson planning, creating daily activities and the training one goes through to gain skills and competency. Preparing for teaching will enable a teacher lead to productive, engaging lessons for their students and maximize the effectiveness of their time and resources. Preparing for teaching will help one sharpen their teaching skills and philosophies and perform effectively in their career role. Teachers need to have significant knowledge, skills and abilities to create a learning environment.

Research carried out by Zuryanti et al., (2017) revealed that mindset transformation, curriculum concepts comprehension, ability to analyse subject matter, and teaching design were some of the factors influencing elementary school teachers' preparedness in implementing the curriculum. Teachers need to emphasize the importance of collaboration between teachers and students. Teachers' mindset is associated with a few changes such as a strong desire and acceptance or openness to accept the change, strategy implementation, management, and leadership learning. According to Asdin & Erlina, (2022), teacher's sufficient capacity to develop lesson plans which were oriented to the inquiry process, peer support, and teachers' working groups affected the readiness of

the teacher to assess inquiry-based science in elementary schools. Chege (2014) found out that, personal characteristics, prior computer training, and ICT infrastructure have to some extent some influence on teachers' preparedness to use ICT in teaching.

Teacher preparedness can be referred as collective knowledge, attitudes and skills that enhance the designed curriculum in a way that leads to improving the quality of education as evinced by improved academic performance (Ondimu, 2018). Kimosop (2019), states that poor teachers' preparedness tends to lead to poor students' academic performance. According to Abraham et al., (2021) the majority of teachers in the USA devised what might now be labelled as alternative ways where teachers were prepared in school district-based programs. Teacher preparedness indicates a significant impact related to the promotion of teacher capacity as well as the quality of education (Kee, 2012).

Cochran & Maria (2015) state that a low standard of teacher preparedness affects negatively the performance of students in school activities mostly in rural areas. Duncan (2009), found out that teacher preparedness in Europe is allied with getting what can make them to increase the teaching experience for all beginner teachers. Woods (2015) added that the preparation and ongoing support of teachers should have regular mentors. A study by Isaboke et al., (2021) recommended that the Ministry of education should equip teachers with the requisite skills, knowledge, and teaching and learning resources to adequately prepare them for implementation of the curriculum.

Teacher preparedness implies a complex process of a teacher processing professional values and attitudes and also being able to put into practice such values established (UNESCO, 2015). Sayed & Ahmed (2015), recommended that the school heads make regular checking of teachers' documents to enhance the level of teachers' readiness. The Ministry of Education is responsible for improving the teaching profession and is required to enhance the quality and quantity of professional training given to teachers. The Non-governmental organizations should collaborate with the school administration to improve the level of teachers' preparedness and students' academic performance.

Lai et al., (2020) recommend that more training and professional development programs should be provided by the school for their teachers to prepare and equip them for the ICT integration in education and further unfold their ICT integration practices in teaching. According Momanyi & Rop (2020), teachers are inadequately prepared. Their knowledge of CBC is vague and this has hampered their delivery and evaluation. It is also recommended that KICD and the Ministry of Education plan for more training sessions to bridge capacity gaps highlighted in pedagogy, Assessment and preparation of teaching documents. Teacher-preparedness plays a crucial role in improving students' grade scores, school completion and active participation of students in the classroom (Kim et al.,2012). Wandera (2019), states that for teachers to enhance their preparedness and be able to improve students' grades, attendance and school completion, they need to identify the students' knowledge gap that they should address as teachers before adapting the standard ways of fulfilling and improving the learner performance.

Purpose of the Study

The study sought to explore the effect of teacher preparedness in use of instructional media on the quality of learning outcomes in Biology theory in public secondary schools in Mwala Sub- county, Kenya.

RESEARCH METHODOLOGY

The study adopted mixed method methodology in data collection. Mixed methods research combines elements of quantitative research and qualitative research gaining a more complete picture as it integrates benefits of both methods (George, 2021).

FINDINGS AND DISCUSSIONS

Quality of Learning Outcomes in Biology Theory

The quality of learning outcomes in Biology theory was determined using a Biology theory test. A total score was computed from the test which represents quality of learning outcomes in Biology. The test was marked out of 50 marks. Table 1 presents data of the Biology theory test.

Table 1: Student's Performance in Biology

School	School Category	Mean	Standard Dev	Min Mark	Max Mark
School A	Extra county	25.95	4.55	18	35
School B	Extra county	24.1	4.19	15	35
School C	County	23.58	4.70	15	34
School D	County	23.30	6.00	15	36
School E	Sub-county	20.60	5.55	12	31
School F	Sub-county	21.34	5.77	12	35
Overall Mean		**23.15**	**5.41**	**12**	**36**

The Biology theory scores show an overall mean score of 23.15. This implies that generally, the performance of students in Biology theory was below the average. This can be attributed to various factors such as poor teacher preparedness, inadequacy of the instructional media used, students' attitude towards the subject and poor quality of teaching. Those in county schools perform better than those in sub-county schools (See Table 1). By design, the extra-county schools are more resourced in terms of manpower. In addition, extra-county schools enrol students who have higher scores in the Kenya Certificate of Primary Education (KCPE) as compared to both county and sub-county schools. Test score results based on the school category indicate that form 2 students in the extra-county schools relatively perform better than their counterparts in both county and sub-county schools.

Teacher Preparedness in use of Instructional Media and the Quality of Learning Outcomes in Biology Theory

The objective explored the effect of teacher preparedness on the quality of learning outcomes in Biology theory. To respond to this objective, teachers were asked the extent of their preparedness in the use of instructional media and its impact on the quality of learning outcomes in Biology theory. A scale of 1-5 was adopted where; **1=Always (A), 2=Often (O), 3=Sometimes (S), 4=Rarely (R), and 5=Never (N)**. Descriptive results are presented in Table 2

Table 2: Teachers Preparedness on the use of instructional media

Variable	A %	O %	S %	R %	N %	Mean	Std. Deviation
I have attended in-service training on how to use instructional media to promote the quality of learning outcomes in Biology theory	16.7	16.7	16.7	33.3	16.7	2.83	1.47
I incorporate instructional media when making lesson notes to promote the quality of learning outcomes in Biology theory.	0.00	0.0	33.3	33.3	33.3	2.00	0.89
I incorporate instructional media when preparing lesson plans to promote the quality of learning outcomes in Biology theory	0.0	0.0	16.7	33.3	50.0	1.67	0.82
I select instructional media for use in teaching Biology theory to promote the quality of learning outcomes in Biology theory	0.0	0.0	33.3	50.0	16.7	2.17	0.75
I have attended teachers' workshop on how to use instructional media in teaching to enhance the quality of learning outcomes among students.	0.0	33.3	33.3	16.7	16.7	2.83	1.17
I prepare teaching aids to use in teaching Biology theory to enhance the quality of learning outcomes in Biology theory.	0.0	0.0	0.0	66.7	33.3	1.67	.52
I incorporate instructional media when preparing schemes of work to promote the quality of learning outcomes in Biology theory.	0.0	0.0	33.3	50.0	16.7	2.17	0.75
I know when to use instructional media in teaching of Biology theory to promote the quality of learning outcomes in Biology theory	0.0	0.0	0.0	50.0	50.0	1.50	0.55

Mean: Always=1.00-1.80, Often=1.81-2.60, Sometimes=2.61-3.40, Rarely=3.41.4-20, Never=4.21-5.00

The summary results show that most Biology teachers rarely (33.3%) attended in-service training on how to use instructional media to promote the quality of learning outcomes in Biology theory. According to findings, only 16.7% of the Biology teachers interviewed argued that they always attend the in-service training. Concerning incorporation of instructional media, 33.3% of the teachers incorporate, 33.3% of the teachers said that they sometimes incorporate the instructional media in lesson planning. Equally important, findings show that 33.3% of Biology teachers never incorporate instructional media in lesson planning. The results further show that while 50% of the teachers interviewed rarely select instructional media to use in teaching Biology theory, 33.3% of the

teachers sometimes attend workshops on how to use instructional media in teaching Biology. Results also indicate that while most Biology teachers (66.7%) interviewed rarely prepare teaching aid to use in teaching Biology, 50% of them rarely incorporate instructional media in preparing schemes of work. The findings also show that 50% of the Biology teachers do not know when to use instructional media in teaching.

Generally, these data show that Biology teachers were not well prepared on the utilization of instructional media resources. Less than average performance observed could be attributed to insufficient teacher preparedness. Preparing for teaching will enable a teacher conduct a productive and engaging lesson. Poor teacher preparedness may have resulted from resource constraints.

The findings are consistent with Ondimu (2018) who observed that preparing for teaching will enable a teacher lead to productive, engaging lessons for their students and maximize the effectiveness of their time and resources. The findings concur with those of Kimosop (2019) who underscores that poor teachers' preparedness leads to poor students' academic performance.

The findings are also supported by Cochran & Maria (2015) who observes that a low standard of teacher preparedness affects negatively the performance of students in school activities mostly in rural areas. Similarly, Duncan (2009), agrees that teacher preparedness in Europe is affiliated with getting what can make them to increase the teaching experience for all beginner teachers.

The findings were also supported by Heads of department interview results which revealed that;

"……some of our teachers are not sufficiently trained….the biggest challenge we have is resources…….some of the instructional media are out of date…we don't have internet…." (HOD1, Mwala sub-county)

Another respondent was of the opinion that;

"….Yes. To a larger extent, our teachers here incorporate instructional media in lesson planning. Teacher preparation in terms of lesson planning and teaching is very critical. Well organized teachers will always deliver in class." (HOD05, Mwala sub-county)

RECOMMENDATIONS FOR PRACTICE

The study made the following recommendations:

1. The Teachers Service Commission should train and sensitize teachers on the use of instructional media. This is critical especially in the wake of Competency Based Curriculum implementation.
2. School principals should emphasize and supervise the use of instructional media in teaching in their schools to enhance teacher effectiveness.

3. The Ministry of Education should induce programmes on the use of instructional media.

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