Teachers' Perception and Support on the Use of Information Communication Technology in Teaching/Learning of Biology in Secondary Schools in Uasin Gishu County, Kenya

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Abstract: *A review of studies on the use of technology in education consistently has found that students in technology-rich environments experience positive effects on performance in all subject areas. Further, the use of interactive multimedia software, for example, motivates students and leads to improved performance. In fact, studies have shown that more students finish high school and many more consider attending college where they routinely learn and study using technology. The discussions on this paper draw from a study whose aim was to investigate teachers' perception and support in the use of information and communication technology in Biology in Uasin Gishu County, Kenya. Descriptive survey research design was used in the study. The target population for the study was 123 secondary schools. The study used stratified sampling to select a sample of 114 teachers. From the study findings, teachers showed positive perception in integrating of information and communication technology in Biology. It was thus recommended that there should be on-going support for Biology teachers so that they utilize their skills on information technology in the teaching process. The school administration should encourage Biology teachers to use computers as much as other resources such as books and make teachers aware of the opportunities/ importance that technology offer.*

Keywords: Perception, Support, Use, Information, Communication Technology Resources, Teaching, Learning, Biology, Secondary Schools, Uasin Gishu County, Kenya

1. Introduction

Researchers have examined the relationship between teachers' perceptions of the use of ICT and their actual integration of ICT into teaching and learning processes. Eugene [1] explores the effect of teachers' beliefs and attitudes on the use of ICT in classrooms. In Eugene's (ibid.) study, an observation method was used to collect data on teachers' beliefs and attitudes. The study revealed that there is inconsistency between teachers' beliefs and their actual use of technology in the classroom. Teachers' beliefs and teaching practices were found not to match. Similarly, Simonson [2] has used a quantitative study to explore the beliefs of primary school teachers on the use of ICT in teaching. The results revealed that teachers' beliefs and attitudes are related to their use of technology. Moreover, Drent and Meelissen [3] have studied the factors that influence the innovative use of ICT by teacher educators in the Netherlands. A sample of 210 teachers was used for the study. Their study revealed that student-oriented pedagogical approach, positive attitude towards computers, computer experience and personal entrepreneurship of the teacher educator have a direct positive influence on the innovative use of ICT by the teacher.

Research has also shown that teachers' attitudes towards technology influence their acceptance of the usefulness of technology and its integration into teaching [4]. In EU Schoolnet [5] survey on teachers' use of Acer net books, involving six European Union countries, a large number of participants believed that the use of net book has a positive impact on their learning, promotes individualized learning and helps to lengthen study beyond school day. However, evidence suggests that a small number of teachers believes that the benefits of ICT are not clearly seen. The empirical survey revealed that one-fifth of European teachers believed that the use of ICT in teaching does not benefit their students' learning [6]. A survey of UK teachers also revealed that teachers' positivity about the possible contributions of ICT was moderated as they became 'rather more ambivalent and sometimes doubtful' about 'specific, current advantages' [7].

Not all teachers are convinced that ICT should be an integral part of their teaching strategies [8] resisting change to effective ICT integration. Research has shown that teachers of younger age are associated with more positive attitudes towards ICT. This is in agreement with the report by the US National Centre for Education Statistics [9] which indicates that younger teachers score higher on their perception of ICT, and have translated their positive perception into higher degree of ICT use in education. Thus, it was hypothesized that teachers of younger age make more use of ICT in schools, compared to the elderly counterparts. On the other hand, Atan *et al*. [10] have found that users exhibit greater competence in computer technology when they make frequent use of it. Hence, it is predicted that teachers who make daily use of ICTs are more likely to be competent in ICTs compared to those with a lower rate of adoption. Teachers need to be sensitized on the value of ICT because many teachers tend to perceive themselves as technologically incompetent and often feel deskilled and demoralized when they first begin to use computers in the classroom. Therefore, whenever schools consider introducing ICT as a subject in its own right, it must always go hand in hand with the integrative approach and be accompanied by the teachers keen interest in expanded paradigms as they relate to the roles of teachers and students. Learners must be encouraged

to construct, evaluate, manipulate and present their ideas while demonstrating understanding of curriculum concepts and innovative constructs. It is precisely in this way that all in the education sector should aim to prepare students to work in the types of classrooms where knowledge is actively used and students are given more responsibility for their own learning when ICT is effectively integrated as a tool of technology into the curriculum. Clearly, there is enough evidence to show that teachers need to inculcate the willingness to learn enough about ICT to make effective use of it in the classroom.

1.1 Relationship between using ICT in Teaching Biology and Students' Performance in Biology

A review of studies on the use of technology in education consistently has found that students in technology-rich environments experience positive effects on performance in all subject areas [11]. In particular, Becta [12] points out that ICT provides fast and accurate feedback to students and speeds up computations and graphing, thus freeing students to focus on strategies and interpretation. Further, the use of interactive multimedia software, for example, motivates students and leads to improved performance. In fact, studies have shown that more students finish high school and many more consider attending college where they routinely learn and study using technology [12]. Barak [13] points out that the use of ICTs in education would promote deep learning and allow schools to respond better to the varying needs of the students.

1.2 Problem Statement

A review of studies on the use of technology in education has consistently found that students in technology-rich environments experience positive effects on performance in all subject areas. Despite the many advantages associated with the use of ICTs that have been documented in past literature and the numerous government efforts to investment in training and resources to integrate the use of ICT in its operations, the rate at which ICTs are used in the Kenyan classrooms is still far below expectation. For the realization of the Kenya Vision 2030, secondary school teachers need to use adequate computers in classroom teaching. In addition, the demand for ICT learning has been tremendous and the number of teachers who are trained to teach ICT cannot meet the demand. This failure to use ICT is itself a result of the prevailing digital and knowledge divides, and their causes are deeply embedded in the learning and performance of Biology. Therefore, there is need to energize action to bring technology into the classroom for improved Biology teaching, learning and performance. As such, the study sought to investigate integration of information and communication technology in the teaching and learning of Biology in secondary schools in Uasin Gishu County.

1.3 Limitations of the Study

The research into the integration of ICT in teaching Biology was relatively new and hence little information on the subject was accessed. In addition, teachers and students who are steeped in the traditional method of teaching Biology and are still groping in the dark were reluctant to volunteer information. However, the author overcame this obstacle by explaining to the teachers that the outcome of the study would result in success of the teaching and learning of Biology in the District. The study was only limited to 123 schools using ICT in teaching and learning Biology in Uasin Gishu County, where descriptive survey research design was used.

2. Materials and Methods

The research used a descriptive survey design. It was conducted in Uasin Gishu County which is a cosmopolitan area. The target population included all trained Biology teachers and principals/head teachers in all 123 secondary schools in Uasin Gishu County. The study sampled 30% schools from a population of 123 giving 38 schools. From each of the secondary schools, 3 Biology teachers were selected randomly to participate in the study. The Biology teachers were randomly selected because of their knowledge in Biology and use of laboratory as well as their contact with the modern ICT while the Heads of Departments (HoDs) were selected purposively. Therefore, the total number of teachers selected from 38 schools was 114. Head teachers of every school sampled were selected purposively to participate in the study, making a sample of 38. The total sample size of the study was therefore 152 respondents.

The instruments used to collect data for this the study were self-administered questionnaires, observation and interview schedules. DATA was analyzed descriptively. Data analysis was facilitated by use of Statistical Package for Social Science (SPSS) computer program. Descriptive statistics were employed in analyzing qualitative data where frequencies and proportions were used in interpreting the respondents' perceptions of issues raised in the questionnaires so as to answer the research questions.

3. Results and Discussion

3.1 Ongoing Support

The study sought to establish if there was ongoing support of teachers to enable and motivate them utilize ICT in their teaching of Biology in schools in Uasin Gishu County. The findings were as shown in Table 1.

Table 1: On-going support

		SD	N	SA
KIE provides quality, relevant and affordable educational and training programmes for Biology teaching	Frequency	43	12	55
	Percent	39.1	10.9	50
KNEC develop and assess Human ICT Resources through National Examination for Biology integration in all levels of learning	Frequency	39	29	42
	Percent	35.4	26.4	38.2
TSC recruit qualified Biology ICT teachers	Frequency	60	18	32
	Percent	54.5	16.4	29.1
KIE Design and develop ICT curriculum for Biology for all levels of education and training	Frequency	36	30	44
	Percent	32.7	27.3	40
KIE develop learning ICT resources for Biology, e.g. Books manual, Multimedia resources, conducting in service training of teachers and trainers in new curriculum trends in education and training	Frequency	44	14	52
	Percent	40	12.7	47.3

SD = Strongly Disagreed (SD+D) N = Neutral SA = Strongly Agreed (SA+A)

As shown in Table 1, it is evident that the ongoing support for ICT integration in teaching and learning Biology makes it possible for teachers to upgrade their knowledge and skills. From the findings, 55(50%) of the respondents strongly agreed that KIE provides quality, relevant and affordable educational and training programs for Biology teaching. Some, 43(39.1%), of the respondents strongly disagreed that KNEC develops and assesses Human ICT resources through the National Examination for Biology integration in all levels of learning. Sixty (54.5%) TSC-employed qualified Biology ICT teachers said the KIE designs and develops ICT curriculum for Biology for all level of education and training and 36(32.7%) said the KIE develops ICT learning resources for Biology, for instance, book manuals and trainers in new curriculum trends in education and training. Research has identified that there is low support for the ICT integration due to lack of assistance [14].

3.2 Perception on the Use of ICT

Information and communication technology is of great importance to both learners and teachers. Both students and teachers are able to develop learning skills such as thinking and problem solving skills. The research, therefore, sought to establish the perception of teachers on the use of ICT. The findings were as shown in Table 2.

Table 2: Perception of ICT use in schools

Perception statements	GD	N	GA	Mean	Std. Deviation
I use computers but not as much as other resources (books, overhead projectors) for instructional purposes	10 / 9.1	11 / 10	89 / 80.9	3.98	1.109
I know what to do when using computers in instructional environments	32 / 29.1	3 / 2.7	75 / 68.2	3.63	1.34
I am aware of the opportunity/importance that computers offer	17 / 15.5	6 / 5.5	87 / 79	3.99	1.192
I think that I can use ICT in class activities more effectively day by day	18 / 16.4	14 / 12.7	78 / 70.9	3.84	1.245
I believe that tools like E-mail will make commutation with my colleagues and students easier	16 / 14.5	3 / 2.7	91 / 82.8	4.02	1.354
I think that ICT supported teaching makes learning more effective	17 / 15.5	1 / 0.9	92 / 83.6	4.27	1.284
I think the use of ICT increases the quality of courses and productivity of teacher	10 / 9.1	7 / 6.4	93 / 84.5	4.25	1.169
I think that usage of ICT makes it easier to prepare courses material	10 / 9.1	1 / 0.9	99 / 90	4.17	1.099
It is hard for me to explain the use of computer application to my students	36 / 32.7	13 / 11.8	61 / 55.5	3.37	1.532
I think ICT makes effective use of class time	38 / 34.5	4 / 3.6	68 / 61.9	3.6	1.575

GD = Generally Disagreed (SD+D) N = Neutral GA = Generally Agreed (SA+A)

The study findings revealed that 89(80.9%) of the respondents used computers but not as much as other resources (books, overhead projectors) for instructional purposes (mean = 3.98). Moreover, 75(80.9%) of the teachers knew what do when using computers in instructional environments (mean = 3.63). In addition, 87(79%) of the teachers were aware of the opportunity that computers offer (mean = 3.99). Ninety-one (70.9%) of them thought that they could use instructional technologies in class activities more effectively day by day (mean= 3.84). Furthermore, 91(82.8%) teachers also believed that tools like e-mail will make communication with colleagues and students easier (mean = 4.02).

Positive attitudes towards the use of information and communication technology in teaching Biology may make teachers more interested in adopting the new technology, learning more about new technology and be more willing to cope with the challenges of the new technology. The study findings showed that 89(80.9%) of the teachers thought that technology-supported teaching makes learning more effective (mean = 4.27). In addition, 93(84.5%) of the teachers thought that the use of instructional technologies increases the quality of courses and productivity of teachers (mean = 4.25).

In addition, 99(90%) of the teachers thought that the usage of instructional technologies makes it easier to prepare course materials, for instance, assignments and handouts (mean = 4.17). However, it is hard for teachers to explain the use of computer application to students as shown by 61(55.5%) of the respondents (mean = 3.37). In conclusion, teachers thought that technology makes effective use of class time as revealed by 68(61.9%) of the respondents (mean = 3.6). The teachers' positive attitudes and perception of integration of ICT products is bound to their increase knowledge and skills in teaching and learning of Biology.

3.3 Use of ICT and Ability in Teaching Biology

The research sought to establish the teaching capabilities of the respondents. The findings are illustrated in Table 3.

Table 3: Use of ICT in Teaching Biology

	GD	N	GA	Mean	Std. Deviation
I am able to teach Biology effectively using materials from the internet	0 / 0	23 / 20.9	87 / 79.1	4.32	0.801
I can cover Biology syllabus within the time given with help of computers integrated system	19 / 17.3	13 / 11.8	78 / 70.9	4.04	1.149
I am able to plan Biology lessons effectively using Excel timetables and reminders from the mobile phones.	0 / 0	22 / 20	88 / 80	4.32	0.789
I am able to organize teaching resources in order using computer organizer	0 / 0	25 / 22.7	85 / 77.3	4.24	0.801
I am able to effectively evaluate Biology performance of students through Microsoft excel	0 / 0	19 / 17.3	91 / 82.7	4.32	0.753

GD = Generally Disagreed (SD+D) N = Neutral GA = Generally Agreed (SA+A)

The findings in Table 3 show that when ICT products are used in teaching and learning of Biology, respondents are able to teach more effectively (mean = 4.32) and cover the Biology syllabus within the given time (mean = 4.04). In addition, teachers are able to plan Biology lessons effectively

using ICT (mean = 4.32) and organize teaching resources in order (mean = 4.24). Lastly, teachers are better able to effectively evaluate Biology performance of students (mean = 4.32) when they use ICT resources in teaching and learning of Biology.

From the study findings, it is evident that positive attitude toward technology enables teachers to adapt to new technologies, embrace the different changes in technology and also deal more aptly with emerging challenges. The findings revealed that teachers think that technology-supported teaching makes learning more effective. The findings therefore concur with the views of Drent and Meelissen [3] in their study on the factors that influence the innovative use of ICT by teacher educators in the Netherlands. They posit that positive attitude towards computers and computer experience has a direct positive influence on the innovative use of ICT by the teachers.

The research findings on the usage of ICT are also in agreement with what Huang and Liaw [4] say, that teachers' attitudes towards technology influences their acceptance of the usefulness of technology and its integration into teaching. Teachers also think that the use of instructional technologies increases the quality of courses and productivity of teacher. This is in agreement with the observations of EU Schoolnet [5] survey on teachers' use of Acer net books where it was revealed that large number of the participants believed that the use of net book had positive impact on their learning and lengthened study beyond school day. On the contrary, one-fifth of European teachers believed that the use of ICT in teaching did not benefit their students' learning and not all teachers are convinced that ICT should be an integral part of their teaching strategies as a result of resisting change to effective ICT integration.

4. Conclusions and Recommendations

From the study results, it is clear that teachers' perception has a momentous effect on the teaching/learning of Biology. The findings show that positive attitude of teachers towards technology makes them more interested in adopting new technology and innovative use of ICT by the teachers which improves the learning process of students. Finally, teachers' perception has a significant effect on the teaching/learning of Biology as evidenced from the study. Therefore, school administrations should encourage teachers to use technology, e.g. computers as much as other resources such as books and make teachers aware of the opportunities/ importance that technology offers. There should also be workshops organized by the school to stress on the importance of adapting to changes in technology.

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