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Abstract

Purpose: The research was to establish teachers' attitude towards integrating ICT in classroom instruction

Methods: The study was carried out in secondary schools of the southern region, Eritrea. A descriptive survey research design was adopted. The study targeted 27 public secondary schools in the region. Stratified random sampling technique was used to get a sample of 12 secondary schools from 12 sub-regions. The sample of respondents of the study was drawn from these 12 secondary schools of 12 sub-regions. The respondents were 12 school directors, 34 Biology teachers and 175 grade eleven students. Questionnaires, interview and observation schedules were used as instruments for data collection. Questionnaire for Biology teachers and students, Interview Schedule for school Directors, were employed. Piloting and consultation were conducted to establish validity and reliability before the instruments were used for the actual data collection. The data collected included both qualitative and quantitative data. The quantitative data were analyzed using Statistical Package for Social Sciences (SPSS). The qualitative data obtained from the open-ended questions were analyzed thematically based on research objectives.

Results: The study found that majority of Biology teachers who participated in the study had a positive attitude towards the use of ICT in teaching and learning. They liked to use ICT in their Biology lessons; they believed ICT makes learning Biology interesting, understandable and improves learners' performance

Unique Contribution to Theory, Practice and Policy: The study recommended that Ministry of Education should provide adequate in-service training on ICT integration skills for teachers

Key Words: *Teachers' Attitude, ICT Integration, Classroom Instruction*

1.0 INTRODUCTION

Attitude is one of the teacher's factors that affect the use of ICT in the classroom. Having a positive attitude is crucial in integrating ICT in education. Muslem, Yusuf and Juliana (2018) conducted a study on attitude and barriers to ICT use among English teachers in Indonesia. The study used a questionnaire and interview for 26 teachers selected by purposive sampling technique. The findings of the study showed that participant teachers had positive perceptions of the implementation of ICT in classroom teaching and learning. Teachers believe that ICT support them in their lessons as well as helps them to find information that enriches their lessons easily and quickly. They also think that ICT makes teaching in the class more interesting.

Hong (2016) carried out a study on teachers' views of ICT integration using open-ended, semi-structured interview for 23 teachers from different parts of Colorado, USA. The study revealed that teachers involved in the study had a positive attitude towards ICT as an instructional tool**.** They liked ICT as a pedagogical tool and as a resource bank for their teaching. Teachers wanted to learn new ways of using ICT to deliver instructional materials to students effectively and showed their willingness to incorporate ICT in their lessons frequently. This is because they believed that ICT is a current trend, and it has many benefits for students. Further, the study found that low availability of ICT resources, especially the availability of computers and unreliable internet connection were major barriers that limited the implementation of ICT in the classroom.

Daher, Baya'a and Anabousy (2018) conducted an experimental study on in-service Mathematics teachers' integration of ICT as innovative practice in lower secondary and found out that the teachers had positive attitudes and beliefs. Despite their positive feelings, teachers were reluctant to integrate technology in their lessons due to their little experience and different obstacles they encountered in the integration of ICT in education.

According to the study carried out by Semerci and Aydın (2018) on examining high school teachers' attitudes towards ICT use in education, applying descriptive research design and questionnaire for 353 teachers working in different schools of Ankara, turkey. Teachers displayed a high level of positive attitude towards ICT use in education and low level of anxiety towards ICT use in education.

Adegbenro, Gumbo and Olakanmi (2017) investigated in-service secondary school teachers' technology integration needs in an ICT enhanced classroom in Pretoria, South Africa using Questionnaire and focus group discussion. The finding of the study revealed that teachers had positive attitudes towards using computers in their classrooms. Teachers were willing to learn more about how to integrate computers in the teaching and learning processes. However, teachers faced difficulties in the implementation of ICT in classroom practices due to their inadequate knowledge and lacked skills to use ICT in their pedagogical practices. According to Ottestad (2013), an online survey was done on 247 school leaders, and 386 teachers from Norwegian primary and lower secondary schools revealed that there was a correlation between the attitude and behavior of school leaders and the attitude and behavior of teachers regarding ICT integration in classroom practices.

A study conducted by Msila (2015) in South Africa, using an interview to explore the view of teachers on digital technology use in instruction. Findings showed that younger teachers were more open-minded than the older teachers who found the introduction of ICT discouraging. In the end, the study concluded that the success of digital technology in classrooms depends more on teacher competence as well as positive attitudes towards ICT. Similarly, a study conducted on pre-service Biology teachers attitude toward the use of ICT in Biology teaching revealed that pre-service Biology teachers had a positive attitude with no difference in gender or class (Yapici and Hevedanli 2012). The presence of a positive attitude in teachers enhances the use of ICT in instruction. However, least was known about Biology teachers' attitude towards the integration of ICT in teaching and learning in the Southern Region's secondary schools in Eritrea.

Statement of the Problem

The use of technology has influenced all human aspects of life, and it has an impact on how education is delivered. The Government of Eritrea, through the Ministry of Education, has placed effort in introducing a new curriculum that focuses on learner-centered, outcome-based interactive pedagogy. The new curriculum allows learners to actively participate in their learning. In addition to this, ICT policy in education has been launched for integrating ICT in education. While studying Biology is important for it generally helps us to get a better understanding about ourselves, the world and its natural processes, the performance of this subject in secondary schools in Eritrea was not satisfactory in the last five years. The performance of Biology, as indicated in table 1.1, was poor in the last five years. This can have a serious implication for the quality of education and discourage students from studying Biology. This problem of low performance could be solved by integrating ICT in teaching and learning of Biology.

Various researches conducted on ICT integration in education have proved that integrating ICT in teaching and learning improves the quality of learning and performance of learners. Moreover, ICT integration simplifies abstract and complex concepts, creates cooperative learning, and creates interest in learning among students. In essence, integration of ICT creates a learner-centered learning environment. Although the integration of ICT has many benefits that can be considered as opportunities, it also has numerous challenges. It demands educational transformation such as changing curriculum, assessment, and importantly changing role of teachers from being custodians of knowledge to being facilitators in pedagogy.

The effective integration of ICT in teaching and learning requires the availability of ICT resources, Teachers' preparedness on ICT integration, and attitude of teachers towards ICT integration in teaching-learning. However, it is not clear whether Biology teachers integrate ICT in the classroom instruction with the purpose of improving teaching and learning of biology. This study, therefore, intended to examine the integration of ICT in teaching and learning of Biology in the Southern Region of Eritrea.

2.0 METHODOLOGY

This study used a descriptive survey research design. The study took place in the Southern Region Eritrea. The target population for the study comprised 27 public secondary schools of the southern region, 27 school directors, 78 Biology teachers and 1664 grade eleven Biology

students of secondary schools of the southern region, Eritrea. In this study, stratified, purposive sampling and simple random sampling techniques were used. Stratified sampling was used to determine a sample of 12 schools from 27 public secondary schools. The school directors of the sampled schools were purposively selected to participate in the study. Simple random sampling technique was further applied to obtain Biology teachers and 10.5% of students of grade eleven, making 175 students from the sampled school. From the sampled school, three (3) Biology teachers, one teacher from the list of teachers who teach grade 9, grade 10 and grade 11 was randomly picked to participate in the study. The sample size of the study comprised of 221 secondary schools, school directors, Biology teachers and students. Three-research instruments were used for data collection: questionnaire, interview and observation schedule. The data collected included both qualitative and quantitative data. The quantitative data collected from the sampled secondary schools using teachers' questionnaire, students' questionnaire interview and observation schedules were organized, cleaned, coded and entered into a computer program Statistical Package for Social Sciences (SPSS) for analysis. The quantitative data were analyzed using descriptive statistics such as mean and percentages. The data were presented in the form of tables and figures such as percentages, bar graphs and pie charts.

3.0 RESULTS

3.1 Demographic Information of Respondents

3.1.1 Demographic Information of School Directors

This section presents the demographic information of the school directors who participated in the study. The demographic data explored in the study were gender, computer literacy and professional experience.

a) Gender of school directors

In the study, 12 school directors participated in the interview, and all the school directors were males. This shows that in the sampled school, there were not female school directors.

b) Computer training of school directors

The findings of the study show that all the school directors were computer trained and could able to play a role in supporting other teachers to use ICT in classroom teaching in their schools.

c) Professional experience of the school directors as principals

The distribution of school directors based on their professional experience was as described in table 1.

Table 1: Professional Experience of the School Directors as Principals

Years of experience	Frequency	Percentage (%)
1-5	4	33. 3
6-10	5	41.7
11-15	2	16.7
16-20	1	8.3
Total	12	100.0

Source: School Directors' Interview

The sampled school directors had varied professional experience in the current post as indicated in table 2. One-third of the directors (33.3 %) had less than or equal to five years of experience, 41.7% had between 6 and 10 years of experience. Other 16.7% of the directors had between 11-15 years of experience, and 8.3% had between 16 and 20 years of experience. This shows that most of the school directors (75%) had professional experience of less than ten years.

4.1.2 Demographic Information of Biology Teachers

This section presents the demographic information of Biology teachers involved in the study. Teachers were the main targets of the study because teachers mainly implement ICT integration. The demographic data explored were gender, age, teaching experience, computer literacy, class size and workload of teachers.

a) Gender composition of teachers

The composition of teachers based on their gender was as presented in figure 1

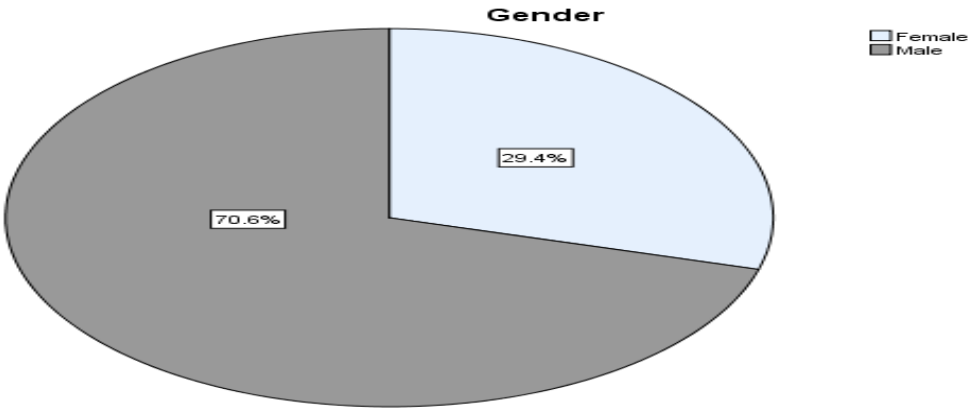

Figure 1. Gender composition of teachers

Source: Teaches' Questionnaire

The finding in figure 1 shows the gender composition of teachers who participated in the study. The greater part (70.6%) of the respondents were male teachers, and the remaining (29.4%) were female teachers. This shows that both male and female teachers participated in the study.

b) Age distribution of teachers

Age distribution of teachers was integrated into the study. The sampled teachers of Biology had varied distribution of age, as indicated in figure 2.

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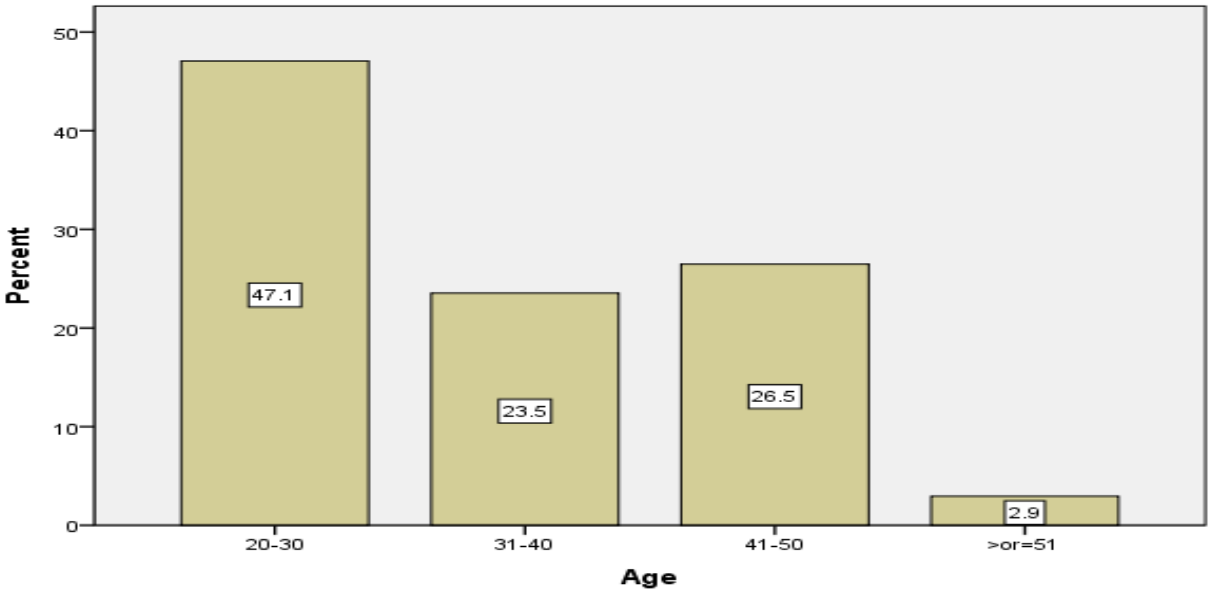

Figure 2. Age distribution of teachers

Source: Teachers' Questionnaire

Figure 2 shows 47.1% of the teachers were aged between 20 and 30 years, followed by 26.5% aged between 41 and 50 years. Another 23.5% were aged between 31 and 40 years. There was only one teacher aged above 50 years in the sampled schools. Majority of the teachers (70.6%) fall in the age range of 20 and 40 years. This shows most teachers that participated in the study were at young were they could easily accept the use of technology in their teaching.

c) Teachers' professional experience

The experience of teachers in their teaching profession was considered in the study. The distribution was as presented in table 2.

Table 2 :Teachers' Professional Experience

Experience	Frequency	Percent
1-2	10	29.4
3-4	5	14.7
5-6	6	17.6
7-8	4	11.8
>9	9	26.5
Total	34	100.0

Source: Teachers' Questionnaire

Table 2 shows 29.4% of respondent teachers had between 1 and two years of experience, seconded by 26.5% of the teachers who had nine and above years of teaching experience. Furthermore, 17.6% of teachers had the experience of between 5 and 6 years, and 14.7% of the

teachers had experience of between 3 and 4 years, and 11.8% of teachers had the experience of between 7 and 8 years. The study found that the majority of the participant teachers were novice of 1-2 years and above 9 years of experiences. This shows that the teachers had different years of experiences in teaching.

d) Computer Literacy of teachers

The researcher sought information on computer literacy levels among Biology teachers. The Findings were as illustrated in Table 3.

Table 3: Computer Literacy of Teachers

Literate	Frequency	Percent%
No	3	8.8
Yes	31	91.2
Total	34	100.0

Source: Teachers' Questionnaire

From table 3, out of the 34 teachers of Biology, 91.2% had computer literacy training, while 8.8% had no computer literacy training. This shows that majority of Biology teachers had received computer literacy training, though the training was not adequate to have competency in computer.

e) Teachers' workload

The workload is the number of periods the teacher teaches in a week. The lowest and highest periods that the teachers had were 15 and 32, respectively. The mean of periods that a teacher had was 23 in a week. If teachers have a heavy workload, it can be a barrier to prepare ICT based classroom lessons.

f) Class size in Biology classrooms

Class size is the number of students in a classroom in a Biology lesson. From the sampled schools, the minimum class size was 46, and the maximum was 73 students in a Biology classroom. The average number of students per class in the sampled schools was 64. This is too large to manage the students' activity in the technology-enhanced learner-centered classroom instruction. In large class size, to use ICT and leaner-centered learning could be a challenge.

4.1.3 Demographic Information of Students

This section presents the demographic information of students involved in the study. The demographic data explored were gender and computer literacy.

a) Gender Distribution of Students

The gender distribution of students involved in the study was as presented in figure 3.

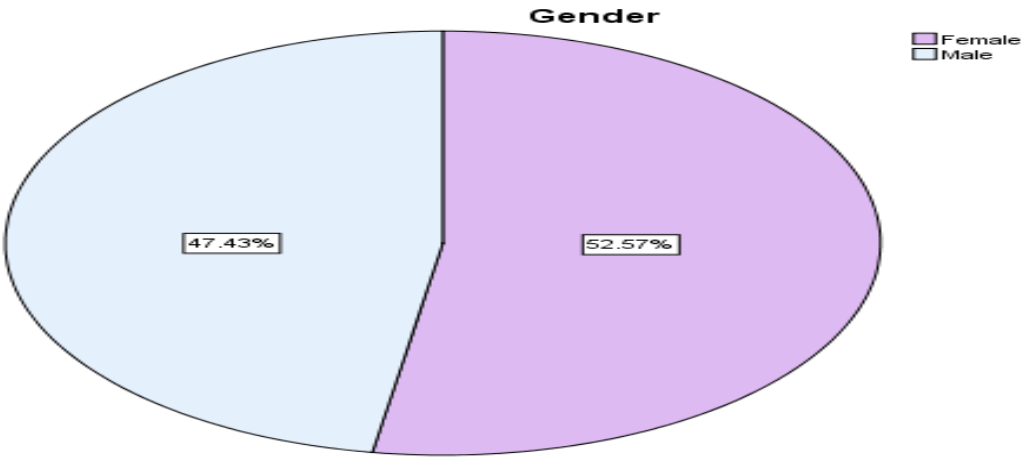

Figure 3. Gender distribution of students

Source: Students' Questionnaire

Figure 3 illustrates the gender composition of students participated in the study. Ninety-two representing 52.6% of the respondents were female students while eighty-three representing 47.4% were male students. This shows that both male and female students participated in the study.

b) Computer Literacy of Students

The level of computer literacy of students was also included in the study. The level of computer literacy of the sampled students was as presented in figure 4.

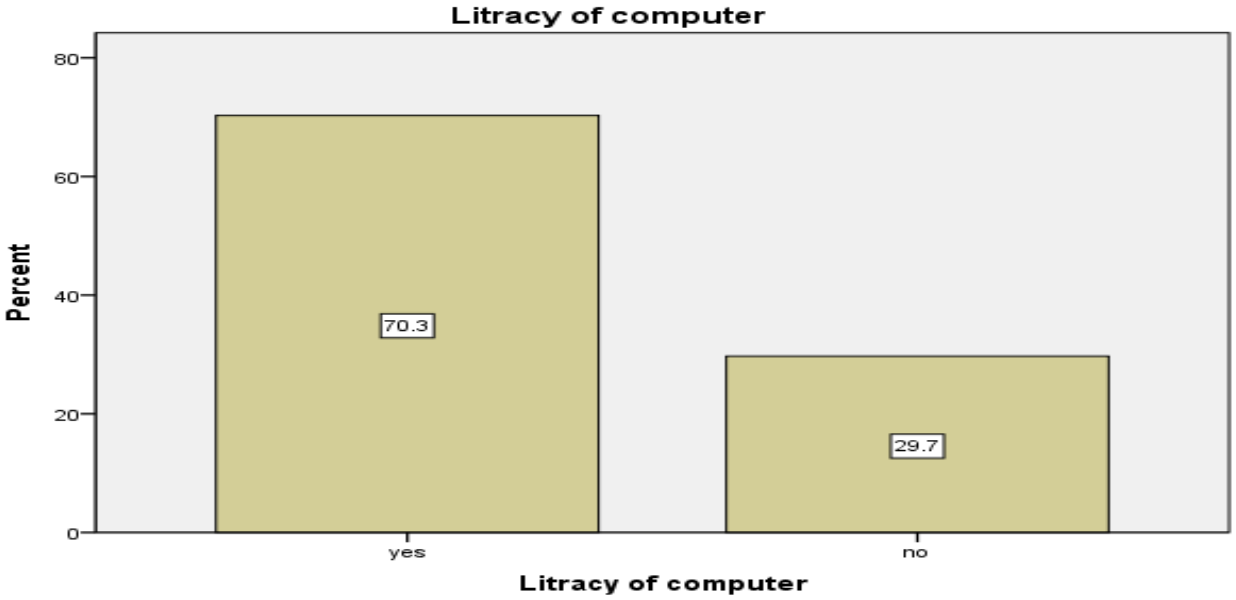

Figure 4: Computer literacy of students

Source: Students' Questionnaire

From figure 4 out of the 175 sampled students, one hundred and twenty-three representing 70.3% had computer literacy, while fifty-two representing 29.7% had no computer literacy. The finding shows that majority of the students had attended in computer training.

4.2 Teachers Attitude towards Integrating ICT in the Instruction of Biology

The study sought to establish the attitude of Biology teachers towards the integration of ICT in teaching and learning of Biology. The attitude of teachers was measured in Likert scale, ranging from strongly agree, agree, neutral, disagree and strongly disagree in the statements that determine the teachers' attitude as illustrated in table 4.

Table 4: Teachers' Attitude towards ICT Integration in Teaching Biology

Statement	SA	A	N	D	SD
Teachers of Biology in this school like using ICT in teaching	16 41.7%	11 32.4%	4 11.8%	1 2.9%	2 5.9%
Students understand Biology very well when ICTs are used	21 61.8%	9 26.5%	3 8.8%	1 2.9%	0 0%
ICT makes teaching and learning more interesting	28 82.4%	6 17.6%	0 0%	0 0%	0 0%
Integration of ICT in Biology lessons improves students' performance in Biology national examinations.	20 58.8%	12 35.3%	2 5.9%	0 0%	0 0%
Students in this school like the use of ICT in Biology lessons	10 29.4%	13 38.2%	7 20.6%	2 5.9%	2 5.9%
ICT makes the students to be active in the Biology lessons	19 55.9%	12 35.3%	3 8.8%	0 0%	0 0%
Much content is covered within a short time when ICT are used in Biology lessons	12 35.3%	15 44.1%	4 11.8%	2 5.9%	1 2.9%

Source: Teachers' Questionnaire

Key: SA= Strongly agree, A= Agree, N= Neutral, D= Disagree, SD=Strongly Disagree

From table 4 majority of Biology, teachers constituting 41.7% strongly agreed and 32.4% agreed that teachers of Biology in this school like using ICT in teaching. However, 11.8% of the respondents were neutral, while 2.9% of them disagreed, 5.9% of teachers strongly disagreed to the statement. Majority of the teachers 61.8% strongly agreed, and 26.5% of them agreed that students understand Biology very well, when ICTs are used, however, 8.8% of the respondents were neutral to the statement. All Biology teachers either strongly agreed 82.4% or agreed 17.6% that ICT makes teaching and learning interesting. The study also showed that majority (58.8%) of Biology teachers strongly agreed followed by 35.3 % who agreed to the statement "Integration of ICT in Biology lessons improves students' performance in Biology national examinations," whereas 5.9% of teachers were neutral. For the statement "Students in this school like the use of ICT in Biology lessons," it was indicated that 29.4%, of teaches strongly agreed and 38.2% of them agreed together constituting 67.6% while few teachers 11.8% disagreed and strongly disagreed. However, 20.6% of teachers were neutral to that.

Majority of teachers 55.9% strongly agreed, and 35.3% agreed that ICT makes the students to be active in the Biology lessons. The study found out that 35.3% of teachers strongly agreed, 44.1% of teachers agreed that much content is covered within a short time when ICT is used in Biology lessons. However, 11.8% of the teachers responded neutrally. The few teachers who strongly disagreed and disagreed comprise 8.8%.

In each of the statement, teachers either agreed or strongly agreed. This shows that majority of the teachers had a positive attitude towards the integration of ICT in teaching and learning. Findings from other researches revealed that teachers believe that ICT could be used as a pedagogical tool in improving their teaching when there are adequate resources and

infrastructures (Ndibalema, 2014). And a Positive attitude of teachers towards the integration of ICT in education has been seen as an important factor to encourage teachers to use ICT in their classroom (Player-Koro, 2012).

In addition to the attitude of teachers, as the beneficiaries of the ICT integration, the study also looked at the attitude of students towards the use of ICT in Biology learning. Table 5 shows the attitude of students towards the integration of ICT in teaching and learning.

Table 5:Students' Attitude toward ICT Use in Learning Biology

	SA	A	N	D	SD
ICT can help to improve students' performance in Biology	109 62.3%	53 30.3%	6 3.4%	6 3.4%	1 0.6%
Teachers of Biology like using ICT when teaching Biology	35 20%	44 25.1%	69 39.4%	12 6.9%	15 8.6%
Students easily understand Biology when ICT resources are used	90 51.4%	58 33.1%	19 10.9%	4 2.3%	4 2.3%
ICT makes learning interesting to students	98 56.0%	53 30.3%	12 6.9%	7 4.0%	5 2.9%
Students like the use of ICT in Biology lessons	103 58.9%	56 32.0%	11 6.3%	1 0.6%	4 2.3%

Source: Students' Questionnaire

Key: SA= Strongly agree, A= Agree, N= Neutral, D= Disagree, SD= Strongly Disagree

As presented in table4.12, over 90% of students strongly agreed and agreed that ICT can help to improve students' performance in Biology, few students (3.4%) disagreed, and another few students (3.4%) were neutral. The study found that 25.1% of respondents agreed, 20 % strongly agreed that teachers of Biology like using ICT when teaching Biology. However, 39.4% of the respondents were neutral to that, whereas 8.6% the students strongly disagreed and 6.9% of the respondents disagreed with the statement.

For the statement, "Students easily understand Biology when ICT resources are used" 51.4% of students strongly agreed. They were seconded by 33.1% of students who agreed, however, 10.9% were neutral. Little percentage (4.6%) of students strongly disagreed and disagreed. Majority, more than 80% of students strongly agreed and agreed that ICT makes learning interesting to students, 6.9% of the students were neutral, whereas 6.9% of them disagreed, only 2.9% of the students responded strongly disagree.

The study found that 58.9% of students strongly agreed, 32.0% of respondents agreed, only 2.3% of students strongly disagreed that students like the use of ICT in Biology lessons, whereas 6.3% of respondents were neutral in their responses. This shows that the majority of students had a positive attitude towards the use of ICT in biology learning.

Majority of the interviewed school directors said that teachers in their schools had a positive attitude towards ICT integration. Teachers like using ICT and believe ICT makes teaching and learning more interesting. Few school directors were not able to decide about teachers' attitude.

One school director was quoted in saying that:

> Without providing ICT resources necessary for teaching and learning their subject, giving them adequate training on how to integrate ICT in biology teaching and without observing them using ICT in their classrooms, it is not easy to judge about teachers' attitude towards ICT integration in teaching and learning. (School Director No.9, 2018).

Based on the quotation of the school director, it was difficult to measure teachers' attitude towards the integration of ICT in Biology lessons before providing the requirements.

The school directors were also asked to give their view on how they see the integration of ICT in teaching and learning. Majority of them believed ICT would improve the quality of teaching and learning. However, few responded that computer and internet could take the attention of students away from their Biology learning. When school directors have a positive attitude towards ICT integration in schools, they can give the necessary support for teachers in using ICT in their lessons. Teachers, students and school directors involved in the study showed a positive attitude towards the integration of ICT in teaching and learning process. The findings of this study were in agreement with several research studies. A study conducted by Semerci and Aydın (2018) on examining high school teachers' attitudes towards ICT use in education, applying descriptive research design and questionnaire for 353 teachers working in different schools of Ankara, turkey. Teachers displayed a high level of positive attitude towards ICT use in education and low level of anxiety towards ICT use in education.

Hong (2016) carried out a study on teachers' views of ICT integration using open-ended, semi-structured interview for 23 teachers from different parts of Colorado, USA. The study revealed that teachers involved in the study had a positive attitude towards ICT as an instructional tool**.** A study conducted on pre-service Biology teachers attitude toward the use of ICT in Biology teaching, the result revealed that pre-service Biology teachers had a positive attitude with no difference in gender or class (Yapici and Hevedanli, 2012).

Although a positive attitude towards ICT is one of the factors for the integration of ICT in education, having a positive attitude alone is not enough for ICT integration in teaching and learning. Adegbenro, Gumbo and Olakanmi (2017) ascertained that teachers had positive attitudes towards using computers in their classrooms. Teachers were willing to learn more about how to integrate computers in the teaching and learning processes. However, teachers faced difficulties in the implementation of ICT in classroom practices due to their inadequate knowledge and lacked skills to use ICT in their pedagogical practices.

4.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

4.1 Summary

In the study, it was revealed that majority of Biology teachers who participated in the study had a positive attitude towards the use of ICT in teaching and learning. They liked to use ICT in their Biology lessons; they believed ICT makes learning Biology interesting, understandable and improves learners' performance. In addition, the study revealed that the attitude of the majority of school directors and students was also positive towards the use of ICT in education.Even though a positive attitude existed in the schools' community, ICT was not applied for teaching and

learning of Biology. This could be due to other barriers that influenced ICT integration in instruction.

4.2 Conclusions

The study concluded that majority of Biology teachers who participated in the study had positive attitudes towards the use of ICT in teaching and learning. The attitude of school directors and students was also positive towards the use of ICT in education. Though the attitude of teachers and school directors was positive, ICT was not integrated into instruction. From this, it is logical to conclude that having a positive attitude alone could not make ICT integration practical in the classrooms.

4.3 Recommendations

The study recommended that Ministry of Education should provide adequate in-service training on ICT integration skills for teachers

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