

Story Telling in Secondary Biology Classrooms for Enhanced Understanding: A Case of Kitwe District

Susan Mwelwa^{1*}, John Soko²

¹Mukuba University P.O. Box 20382, Itimpi, Kitwe, Zambia

²Ministry of General Education, Malela Secondary School P.O. Box 22095, Kitwe, Zambia

Abstract: - Poor performance in Secondary School Biology has attracted the attention of the academic community across the world. Many studies in this regard have been undertaken and Researchers' seem to agree that teaching methods are one of the factors contributing significantly to this problem. This study therefore, sort to find out the effectiveness of Story Telling in teaching Ecology. The study employed a pre-test posttest quasi-experimental design. The data collection instruments used were a Likert-type Attitude Questionnaire and an Achievement test. Data was analysed using descriptive statistics such as means and standard deviations while the analysis of variance was a Statistical test used to compare means. The method of teaching, School and method of teaching by School interaction effect were statistically significant with $F(1, 1037) = 54.22, P < 0.001$, $F(4, 1037) = 17.29, P < 0.001$ and $F(4, 1037) = 17.49, P = 0.000$ respectively. This implies that Achievement varies with the method of teaching and that given a method of teaching, Achievement varies across Schools. Gender and method of teaching by gender interaction were non-significant with $F(1, 1037) = 0.33, P < 0.0561$ and $F(1, 1037) = 6.01, P = 0.908$ respectively. This implies that given a method of teaching, Achievement is the same across gender.

Key Words: Ecology, Story telling, Gender and Achievement.

I. INTRODUCTION

Poor performance in Secondary School Biology is increasingly becoming a source of concern. According to the Examination Council of Zambia (ECZ), the average achievement of pupils in Biology in 2015, 2016 and 2017 were 21.6%, 24.1% and 26.6% respectively. The ECZ reports from 2013 to 2017 show that Ecology is one of the topics that significantly contributes to this poor performance. In this Century, it is necessary that students acquire basic ecological understanding in order to cope with the greatest environmental challenges the world is facing. These among others include; adapting to climate change, ensuring that the remaining biodiversity is conserved, protected and accessing clean water and developing novel creative ways of coming up with renewable energy (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2012; Oyovwi, 2015). Although many researchers agree to the fact that having basic ecological literacy is necessary for an individual to participate and adapt in the constantly changing society, Africa as a whole, including Zambia as a country are however, far from achieving ecological literacy (Cherif, 1992; Melnychuk et al., 2003; Soyly, 2006). Several studies have been conducted in an effort to establish the causes of

challenges faced by learners' when learning Ecology (Cherif, 1992; Cimer, 2011; Manda, 2012). Inappropriate teaching strategies such as the lecture method is one of the major factors contributing to poor performance in Biology as suggested by empirical research (Onyegegbu, 2001; Woodley, 2009; David et al., 2012). Lecturing involves the unidirectional flow of information from the teacher to the learners with little or no interaction between the two parties (Heppener, 2007; Gurpreet Kaur, 2011). The lecture method has a number of advantages including allowing for content coverage within the shortest period and dissemination of information to a large group (Muzumara, 2008; Ajaja, 2009). However, the lecture method hardly gives learners' an opportunity to be engaged in the learning process (Collins and Stevens, 1983). Teaching strategies such as go up discussion and field trips have been employed in an attempt to improve performance among Secondary School pupils. These strategies are believed to engage the learners in the learning process thereby allowing them to experience the phenomena using their sense. Performance in Biology during the Grade twelve-School leaving examinations remains below average in Zambia to date (ECZ, 2016; ECZ, 2016; ECZ, 2017).

1.1 Problem Statement

Poor performance in Biology in the Grade twelve-School leaving examinations has been an area of concern for quite some time (Onyegegbu, 2001; Woodley, 2009; Manda, 2012). This problem has persisted to date, for example, the average Achievement in Biology in 2015 was 21.6% and 24.1% in 2016 and 26.6% in 2017 (ECZ, 2015; ECZ, 2016; ECZ, 2017). Literature show that, several studies to determine the causes of low Achievement in Biology have been conducted and most of them have faulted the methods and strategies adopted in teaching Biology which is predominantly the lecture method (Cherif, 1992; Soyly, 2006; Manda, 2012). While a number of studies have been undertaken to explore the effectiveness of methods like field trip and group discussion in teaching Ecology, the effectiveness of Storytelling in teaching and learning Ecology in Zambia is yet to be established, hence the need for this study.

1.2 Purpose of the study

The purpose of the study was to investigate the effectiveness of Storytelling in teaching and learning Ecology.

1.3 Objectives of the study.

The following objectives guided this study:

1. To determine the effectiveness of Story telling in teaching Ecology among Grade twelve pupils in Secondary Schools.
2. To determine pupils' attitude towards Ecology when taught using Storytelling and lecture method.
3. To find out whether pupils' understanding of Ecology varies with sex.

1.4 Research questions

This study sort answers to the following questions:

1. To what extent is story telling effective in teaching Ecology?
2. What is the effect of Story telling on pupils' attitude towards Ecology?
3. What is the effect of teaching Ecology using Story telling on Achievement across gender?

1.5 Significance of the study

This study is cardinal because it will give an insight into the measures to be put in place in order to enhance basic Ecological literacy among Secondary School pupils' (i.e., enhance understanding of ecology) which is necessary for sustainable development. In addition, the knowledge generated by this research will be useful for stakeholders such as the Ministry of Education to inform policies on curriculum design as well as decision making regarding allocation of the funds to activities such as workshops on teaching and learning to improve the quality of education. It is hoped that, this knowledge will enlighten the Researcher and other research consumers such as Biology Educators on the benefits of using Story telling in teaching Biology as well as the importance of basing their practice on empirical research evidence. The knowledge will also contribute to the existing literature on Science Education.

1.6 Research hypothesis:

H₀₁: Story telling when used as a teaching/learning technique is more effective than the lecture method.

1.7 Theoretical approaches to teaching and learning

Literature across the world show that students exhibit poor performance in biology. This is because many students' find biological concepts difficult to understand (Manda, 2012; Dikel & Nwogu, 2017; Mitalistiani, 2018). Students' interest and attitudes, the nature of Biology, the use of teaching methods that are indifferent from the nature of the material being learnt among others have been attributed to this poor performance (Osborne, Simon & Collins, 2003; Cimer, 2012). Acquiring basic understanding of biological concepts is necessary to participate effectively in today's society. The cognitive theories of learning suggest that, learners are active

participants in their own learning and that their thought patterns, which are influenced by their pre-existing knowledge, which also differs across individual learners', influences the learning process (Henson, 2003). To cognitivists what matters is how the learners' thought patterns interact with the new knowledge regardless of the method of teaching. The constructivists' proponents on the other hand believe that, the learner must be at the center of the learning process. Many Researchers' in fact agree to the fact that pupil-centered approaches are more effective than teacher centered approaches such as the commonly used lecture method (Muzumara, 2008; Manda, 2012; Dikel & Nwogu, 2017; Mitalistiani, 2018). Most Researchers' have argued that the lecture method results in rote memorization of facts, which impedes understanding and consequently hinders transfer of learning (Galindo, & Villafrade M, 2008; Plomer, Jessen, Rangelov, & Meyer, 2010). To this effect, Novak (1987) noted that classroom activities play an important role in arousing and stimulating learners' mental processes. This means that for meaningfully learning to occur, learners must be willing to learn and so the choice of the method of teaching is very critical to achieving the objectives of every learning episode. For example, when learning through Storytelling, learners' will engage in both mental and physical activities, which maximizes learning. The later argument is consistent with Dale (1967), who in his cone of experiences stressed that, the more the number of senses engaged in the learning process, the more learning and the higher the percentage retention of the learnt material. This study is therefore, premised on the fact that, meaningful learning involves the amalgamation of the cognitive and constructivist views of learning because when learners are engaged, cognitive processes become stimulated provoking learners to begin to think and look for relationships between what they are learning and what they already know.

1.8 Story telling

Storytelling is a constructivist technique involving the action of telling a story with the aim of arousing interest in learners' in order to achieve the objectives of the teaching and learning process. Story telling has been in existence for as long as human have been, and human beings enjoy story telling (Stephens et al. 2010). During Storytelling, a friendly environment created, make learners' feel comfortable and willing to participate fully in the learning process. Story telling engage learners' in a number of ways, for example when learners' are listening to a story, they become emotionally engaged and while following through they make their own connections to the subject and consequently get activated, motivated and inspired. According to Kokkotas et al.,(2010) listening to a coherent story, significantly help students' to learn, remember and transfer learning. In other words, engagement in the learning process significantly determines learning and retention of information (Olson, 2015). Story telling therefore has the potential to enhance the achievement of many learning objectives because it improves

classroom atmosphere and facilitates the development of positive attitudes towards what is being learned (Kokkotas *et al.* 2010). Even though many Researchers around the world seem to agree that Story telling is motivating, engaging and offers an effective form of communication in varying situations, its effectiveness in teaching Biology in Zambia is not known.

1.9 Materials and methods

This study had three principal objectives. The first was to determine the effectiveness of Storytelling in teaching and learning Ecology. The second objective was to determine pupils’ attitude towards Ecology when taught using lecture method and Storytelling and the third objective sought to find out whether pupils’ understanding of Ecology varies with sex given a method of teaching. The study span a period 8 weeks. The Researchers developed stories for the lessons while the students’ developed others as tasks given by the Researchers (teachers’). The Researchers used charts and pictures in all the classes.

Study site

The study was conducted at five Secondary Schools in Kitwe district. Of the five Schools, two were girls’; two boys’ and one mixed sex Secondary Schools. Kitwe is the third largest city in terms of infrastructure development, size and population. Helen Kaunda girls and Kitwe boys are next to each other, Chibote girls and Mindolo Secondary Schools opposite each other while Mukuba boys is isolated.

Figure 1 below shows the study site.

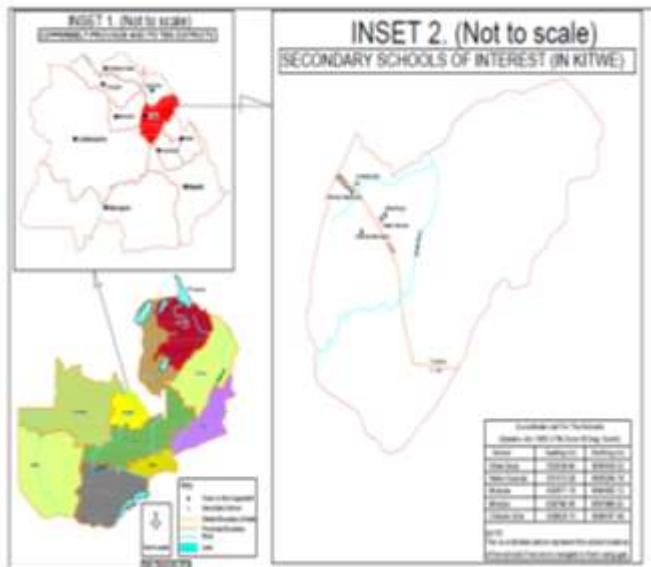


Figure 1: The five secondary Schools incorporated in the study(Mwelwa and Soko, 2020)

II. RESEARCH DESIGN

The study employed a two-group pretest-posttestquasi-experimental design.

R	O1	X1	O2
	O1	X2	O2

Figure 2. Two groupPretest-Posttest quasi-experimental Design

Where;

R: Means random assignment to lecture method group and story group. Two grade twelve intact classes were randomly selected from each of the five schools where the study was conducted. Thereafter, two classes at each School were randomly assigned to the lecture method the Storytelling teaching technique.

O1: Were the observations made during the pre-test measures. Both the lecture method group and the Story telling teaching technique group were pre-tested to determine pre-existing knowledge, and whether or not the two groups were homogenous.

X1: Refers to the Story telling teaching technique group while X2 refers to the lecture method group.

O: Were the observations after two different treatments.

2.1 Sampling Techniques

Purposive sampling was used to select 5 Secondary Schools in Kitwe because the Researchers’ did the teaching and so Schools close to each other were preferred (Ghosh 2006). Two grade twelve classes were randomly selected, and assigned to the lecture and Storytelling teaching techniques at each of the five Schools. Grade twelve students were preferred for this study because the topic of interest to this study (Ecology) is taught at this level in Zambia. The total sample size for this study was 1,200 students with 36% and 64% females and males respectively. The average age of the students was 18 years

2.2 Experimental design and data collection

One group at each School was taught Ecology using lecture method and the other using a combination of lecture and Storytelling. After 8 weeks of teaching and learning, all the groups were then post tested. A Likert-type Attitude Questionnaire was administered before and after treatment. The results of the questionnaire before treatment were used to determine if there were any differences in attitude of pupils towards Ecology between the groups before treatment. After treatment, the observations were then compared within and between the groups to determine any differences and if so to attribute the differences to the treatment.

2.3 Teaching methods

In the first teaching method, a lecture approach to teach Biology was implemented. In this method, the teacher covered contents of Ecology in the Biology 5090 of the Zambian Biology Syllabus. Concepts which were taught under this topic include; habitat, niche, energy flow cycles, deforestation and the ecosystem (CDC, 2013). During the lessons, the

teacher used professionally prepared materials, which included the charts of; energy flow, carbon and nitrogen cycles and food chain and web diagrams. The content for the lessons was derived from the book AS level Biology (Bradfield et.al. 2001) and Grade 12 Biology book (Hanyuma et.al. 2006). To determine whether learning had taken place, class exercises were given at the end of each lesson in order to give students the opportunity to apply what they learnt. In the second teaching method, the same materials as in the first teaching method were used. The methods differed because Story telling was integrated into the usual classroom activities.

In the Storytelling group, learners' were prepared for the experimental condition by providing careful training regarding the implementation of Storytelling. The teacher generated lesson plans that naturally integrated the technique into normal classroom activities. For this reason, the first session included an introduction and discussion on the meaning of Storytelling, and how this would be implemented in the 8-week session in Biology lessons. The teacher introduced the content in the normal fashion and then set aside time for each student to create a Story or the teacher introduced the lesson using Storytelling and then asked learners to share what they learned from the story.

2.4 Pretest and posttest

Data was collected from test scores and questionnaires. PretestS for content and attitude were administered to determine equivalence of the groups before the implementation of the experiment. A posttest was then administered after the implementation of the experiment to determine the effectiveness of each teaching method. Five weeks into the experiment, a midterm test was conducted and the final test was conducted in the last week of the experiment. Each test had three sections; A (20 marks), B (10 marks) and C (20 marks). Section A had twenty multiple choice questions each with 1 point, section B ten short word answer questions each with 1 point and section C three essay type questions each with 10 points. Students were required to answer all questions in sections A and B, and two questions in section C. The students' were notified two weeks in advance that they would take a posttest during the 8th week. Finally, the questionnaire composed of 12 Likert-type ratings and three open-ended questions was administered in the last week of the study to solicit students' attitudes towards Biology.

2.5 Pilot Testing

A pilot test refers to a test done to determine the weaknesses and strengths before final implementation. Piloting a questionnaire is essential if quality data is to be gathered as it plays critical roles in enhancing reliability, validity and practicability of the questionnaire. According to Cohen and Morris (2008), piloting a questionnaire acquaints the Researcher with the necessary information regarding the validity and consistency of the questionnaire items. Piloting the questionnaire therefore helps in removing forms of ambiguity in wording, checks whether the targeted

respondents are well able to respond to questionnaire items, gives insight into the time required to complete the questionnaire and whether the questionnaire is too short or too long, too easy or too difficult. To this effect, sixty copies of the questionnaire were printed and pilot tested on 50 pupils' who were not part of the sample. The data from the pilot study was analyzed in SPSS and reliability test ascertained by conducting the Cronbach's alpha test, which gave the coefficient value of 0.803. According to Devellis (2012), the alpha coefficient of 0.80 can be considered to be good and so this questionnaire had good reliability. The research Supervisor and Biology experts from The Copperbelt University and Mukuba University validated the Ecology Achievement test.

Table 1 is an extract from the Cronbach's reliability test output showing the overall reliability of the questionnaire.

Table 1: Cronbach's Alpha Reliability Test Results.

<i>Cronbach's Alpha</i>	<i>Cronbach's Alpha Based on Standardized Items</i>	<i>Number of Items</i>
0.846	0.803	12

Table 1 results gives a coefficient of 0.846 on the 12 closed ended questionnaire items which is said to be good reliability. The other three questionnaire items were open-ended and so they were validated by content and face validity.

2.6 Ethical issues

This study took into account the research ethics. Firstly, consent from the school authorities was sought and the relevance as well as the procedures involved in undertaking the study were explicitly explained. Confidentiality of respondents was also highly respected and to this effect, the respondents were not required to put their names on the test papers and questionnaires except for identification numbers in order to determine which group the respondent belonged to (Story telling or lecture method group). Respondents were free to withdraw from being part of the study at any time. Finally, the lessons were conducted by the Researchers' according to the School time table to avoid disturbing the School programs thereby according the research site respect.

2.7 Data analysis

This study mainly captured quantitative data and so data was analyzed using descriptive statistics such as the means, median and standard deviations to summarize the data while the analysis of variance was used to test for any statistically significant effect of method of teaching, gender and School on the Achievement of pupils' in Ecology and attitude of pupils' towards Ecology. The t-test was used to test for any significant differences in Achievement of pupils' and attitude towards Ecology in the two groups before instruction while the Spearman's rho correlation was conducted to determine whether a relationship exists between the two dependent variables (Attitude and Achievement) and to what extent.

These analyses were done in the Statistical Package for Social Sciences software (SPSS) version 20. Cohen and Morris (2008) recommends using SPSS stating that, quantitative data analysis can easily be performed using software packages such as SPSS, Minitab or Excel. These software packages have inbuilt statistical formulae and conduct necessary calculations just at a click of few buttons.

III. RESULTS

The purpose of this study was to ascertain the effectiveness of Storytelling in teaching Ecology. The study also determined whether the teaching method influences the attitude of pupils towards a topic or subject as well as whether or not achievement in biology varies with gender. Descriptive statistics related to student's achievement in ecology before and after the treatment measured using a Biology Achievement test, students' attitude towards Ecology after treatment obtained by a Likert-type Attitude Questionnaire and inferential statistics results of testing the null hypothesis are presented in this section. The statistical tests conducted include; an independent samples t-test to determine whether the two groups were equivalent before instruction, the analysis of variance for achievement and attitude as well as the spearman's rho correlation to determine whether the two dependent variables are correlated (achievement and attitude).

Table 3: Post-test percentage Biology average Achievement by method of teaching

School	Teaching Method		
	Story Telling	Lecture	t-value
Chibote girls secondary	83.12	55.02	0.000
Hellen Kaunda girls sec	77.21	35.02	0.000
Kitwe boys secondary	57.24	41.55	0.000
Mindolo secondary	65.00	31.23	0.000
Mukuba boys secondary	52.64	43.67	0.000
Average	67.04	41.25	0.000

Table 3 indicate that the average achievement of Storytelling groups across schools were significantly higher than their lecture method counterparts. This implies that Story telling is more effective than the lecture method.

3.2 ANOVA

Table 4: Post-test Results for the ANOVA

Source of variation	SS	df	MS	F	P
Method of teaching	21026.55	1	21026.55	54.22	0.000***
Gender	131.13	1	131.13	0.33	0.561
School	26825.69	4	6706.23	17.29	0.000***
Method of teaching x Gender	5.15	1	5.15	6.013	0.908
Method of teaching x School	27128.35	4	6782.08	17.489	0.000***
Residual	286569.837	1037	387.781		
Total	1896435.000	1049			

3.1 Descriptive statistics of Biology Achievement test scores in the Pretest

Biology Achievement test was used to measure pupils' understanding of ecological concepts when taught using Storytelling and lecture method. This instrument was constructed using Grade twelve past examination papers as a guide to come up with almost completely new questions. Three Biology Experts from Secondary Schools validated this instrument. Descriptive statistics are given in terms of means, standard deviations with respect to method of teaching, school and gender. Tables 2, 3 and 4 give a summary of results of the Biology Achievement test results obtained at each School by gender with respect to the method of teaching during the pretest.

Table 2: Pretest percentage Biology average Achievement by method of teaching

	Method of teaching	Mean
Pretest	Story telling	18.12±12.29
	Lecture	17.78±9.14

The p-value for the levenes test for equality of variance is 0.52 (df1 1038, df2 1032). The p-value for the levenes test indicates that the two groups were approximately homogenous before intervention.

Having met the conditions for conducting the analysis of variance, this statistical test was conducted to test for any significant differences in Achievement depending on method of teaching, gender and School as well as their interaction effects. The results of this analysis were based on the statistics given in Table 4.

Table 4 shows a statistically significant effect of method of teaching and type of School on Achievement. This table also indicates that the method of teaching interacts with School to influence learners’ Achievement. The method of teaching, School and method of teaching by School are statistically significant with $F(1, 1037) = 54.22, P < 0.001$, $F(4, 1037) = 17.29, P < 0.001$ and $F(4, 1037) = 17.49, P = 0.000$ respectively. This implies that, given a method of teaching, Achievement will vary across schools (single sex or core school). Gender and method of teaching by gender interaction effect are not statistically significant with $F(1, 1037) = 0.33, P < 0.0561$ and $F(1, 1037) = 6.01, P = 0.908$ respectively. This means that, given a method of teaching, Achievement is the same regardless of gender. The method of teaching has the greatest F-value and therefore the most significant of the three independent variables followed by school, and then method of teaching by school interaction effect.

3.3 Pupils’ Perceptions towards Ecology

Perceptions were measured through a Likert-type Attitude questionnaire. The questionnaire was constructed after

brainstorming 30 grade twelve pupils who were not part of the research sample regarding their perceptions towards Ecology. The pupils brainstormed were selected based on them having either high liking or low liking of Ecology to come up with items that span the whole range of attitudes intended to be measured (Field, 2003). Some items from the questionnaire were repetitions whilst others were sensitive and so a total of nine items were discarded remaining with a fifteen questionnaire item. Fifty copies of this questionnaire were printed and pilot tested to 50 pupils’ who were not part of the sample. The data from the pilot study was analyzed in SPSS and reliability test ascertained by the Cronbach’s alpha giving the value of .803. According to Devellis (2012), the alpha coefficient of .80 can be considered to be good. The questionnaire was rated on the following scale;

1= strongly disagree, 2= Disagree, 3=Neutral, 4=Agree, 5= strongly agree

Perceptions of pupils towards Ecology were collected from the two groups (Storytelling and lecture method group) before and after intervention and the following were the results of their analysis.

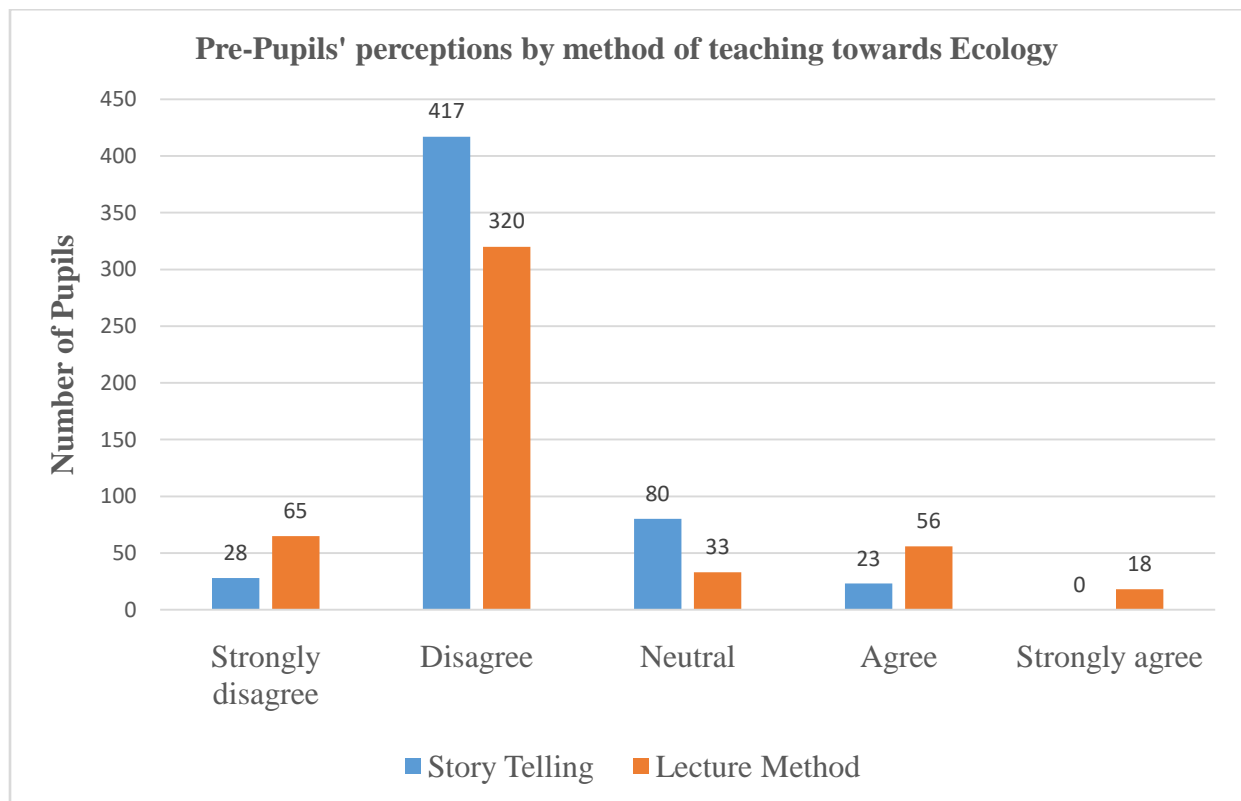


Figure 2: Pupils’ Perceptions towards Ecology by Method of Teaching before Intervention

Strongly disagree and agree reflect the positive attitude while strongly agree and agree reflect positive attitude. Before

instruction, over 80% of pupils’ in both groups exhibited a negative attitude towards Ecology.

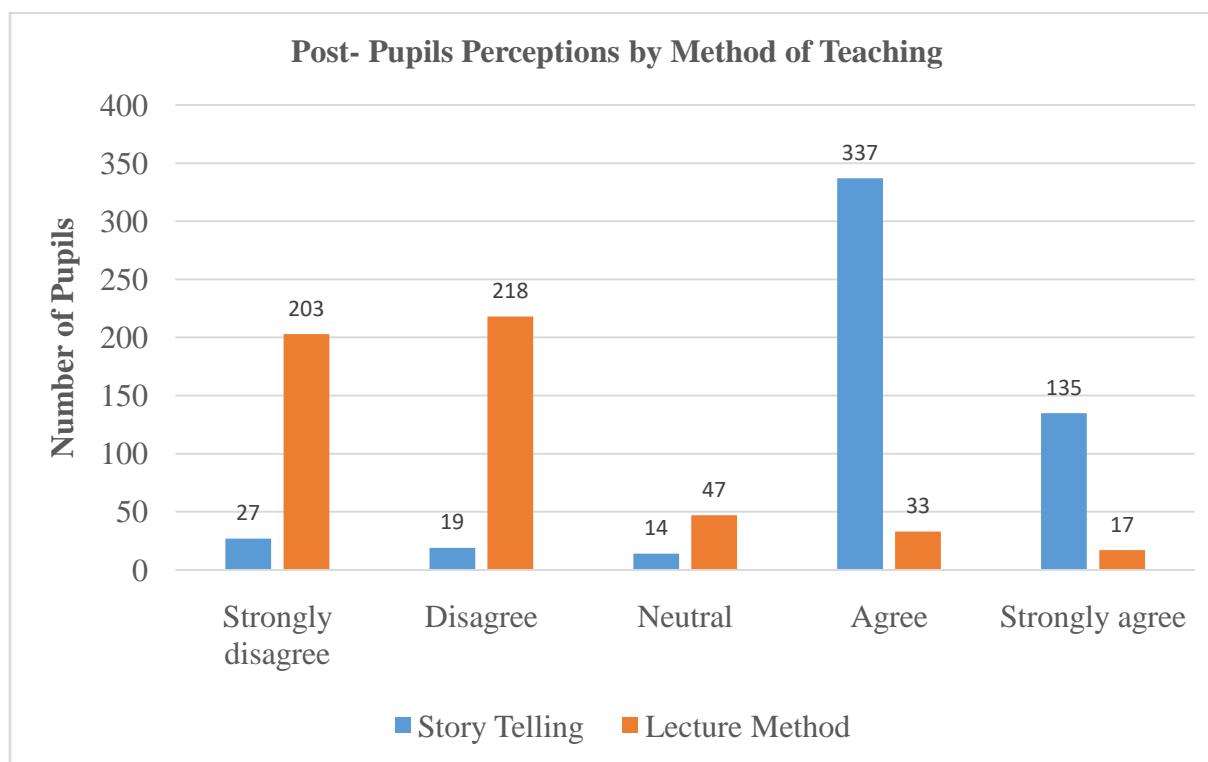


Figure 3: Pupils' Perceptions towards Ecology by Method of Teaching after Intervention

After instruction 89% of pupils in the lecture method group exhibited negative attitude while 82% of pupils; in the story telling group exhibited positive attitude. This shows that the

method of teaching significantly influences attitude towards the subject.

Table 5: Post-test Attitude Results ANOVA

Source of variation	df	SS	MS	F	P
Method of teaching	1	2321.54	2321.54	759.739	0.000***
Gender	1	0.001	0.001	0.004	0.948
School	4	1.160	0.290	0.948	0.437
Method X Gender	1	1.267	1.267	4.140	0.431
Method X School	4	1.650	0.513	1.348	0.253
Residual	991	78.355	0.306		
Total	1040	2848.000			

Table 5 shows a statistically significant result of method of teaching with $F(1,991) = 759.739$, $P < 0.001$. In other words, the method of teaching influences pupils' attitude towards what is being learnt. Gender, School, method of teaching by gender and method of teaching by School are all non-statistically significant with $F(1,991) = 0.00$, $P = 0.95$, $F(4,991) = 0.95$, $P = 0.44$, $F(1,991) = 1.35$, $P = 0.43$ and $F(4,991) = 1.35$, $P = 0.25$ respectively. In other words, given a method of teaching, the attitude of pupils is the same across gender and school.

IV. DISCUSSION

In this section answers to the three research questions that guided the study are given. This study sought to find out the effectiveness of storytelling when used as a teaching technique in biology classrooms compared to the lecture method.

Research Question 1: *To what extent is story telling effective in teaching Ecology?*

The findings of this study are indicating that Story telling is in fact more effective than the lecture method in teaching Ecology. In as much as the lecture method is appreciated for its ability to enable educators disseminate unfamiliar

information to large groups among other advantages, meaningful learning is hardly achieved if used independently. (Cimer, 2011; Oyovwi, 2015) noted that Secondary School pupils find it difficult to understand certain topics in Biology such as Ecology among others because the methods adopted in teaching Biology don't take into account the nature of the topic. The later makes learners' passive resulting in loss of attention and eventual loss of interest in what is being learnt. The findings of this study are consistent with (Csikar & Stefaniak, 2018) who in their study concluded that, Storytelling allow learners' to absorb information and organize it into their existing cognitive structures with little or no effort. The majority of studies regarding Story telling have dealt with public health campaigns. Almost all the studies that have used Story telling in public health campaigns agree that Story-telling serve as an effective tool for community engagement (Mazor et al., 2007; Hopfer, 2012; Bayer & Hettinger, 2019). Utilizing methods such as Story telling not only engage learners', but significantly enhance their understanding of biological concepts because stories facilitate the organization and processing of knowledge in manner the brain works.

Research Question 2: *What is the effect of Story telling on pupils' attitude towards Ecology?*

Attitude is yet another variable that this study focused on which has been proved by a number of studies to be critical in the learning process. According to Bloom (1976), pupils tend to make an effort to learn and understand the meaning of the concepts being learnt if and only if they are interested in learning. The later assertion is consistent with Brothier (2000), who argued that students learn only if they want to learn. In addition, Barila and Beet (1999) stated that students' motivation is an important factor that can lead to raising or lowering pupils' understanding. In other words, learners' positive attitude towards a subject or topic is among the factors that significantly influences understanding. If learners' have a negative attitude towards what they are learning, they will not direct their effort and time in trying to learn and consequently little or no learning will take place. The results in Table 5 indicate a statistically significant effect of method of teaching on pupils' attitude towards Ecology with $F(1, 991) = 759.739, P < 0.001$. These results imply that, how the topic or subject is taught significantly determines how learners 'will react and consequently how much they will learn. In other words, the method used to teach may either make the material being learnt seem to be easy, important and interesting to learn or otherwise. Biology educators therefore, have the responsibility of finding ways of making learners' willing to learn if meaningful learning is to occur.

Research Question 3: *What is the effect of teaching Ecology using Story telling on Achievement across gender?*

The results in Table 4 indicates a non-statistically significant difference in the average Achievement across gender. Table 4 shows $F(1, 1037) = 0.33, P < 0.0561$, meaning that, given a

method of teaching performance is the same across gender. The findings of this study regarding gender are in disagreement with those of Amedu (2015), and Osborne (2003), whose results showed that boys and girls exhibit statistically significant differences in mean achievement in favor of boys. Osborne (2003), whose findings does not coincide with the findings of this study, went on to give attributions to this gender difference in terms of Achievement. Osborne stated that, the teacher, cultural and curricular to mention but a few are among the factors that result in the differences in Achievement that exists across gender. Despite some studies disagreeing with the findings of this study, a number of other studies do in fact agree with our findings. Keeves and Kotte (1992) showed that, there is no statistically significant difference in the average Achievement of girls and boys. The context in which the study was conducted, the subject being investigated, the methods adopted in teaching when conducting the study, the procedures employed as well as the nature of the topic can be among the factors contributing to the varying conclusions by various researchers, regarding gender and Achievement.

V. CONCLUSION

Concisely, many scholars have agreed that most pupils' have challenges understanding some topics in Biology such as Ecology and that, the method of teaching, gender effect and socialization factors contribute to this problem. The findings of this study indicate that, Storytelling significantly improve pupils' Achievement in Biology as well as attitude towards Biology. The findings of this study also suggest that Achievement varies with School and that attitude of pupils' towards a subject is the same regardless of School and gender given a method of teaching. To achieve meaningful learning, teachers should therefore be mindful of factors such as method of teaching and societal beliefs to mention but a few that impacts on learning. The method of teaching especially needs particular attention when planning for lessons as it has potential to influence pupils' attitude and consequently pupils' understanding. Story telling allow learners' to make connections between new knowledge and pre-existing knowledge in more or less the same way as the brain arrange knowledge from simple to complex allowing learners' to understand different concepts and how they are related to make a complete whole resulting in meaningful learning.

5.1 Recommendations for further studies

Based on the findings of this study, the following were the recommendations for further studies.

- Storytelling to be explored as a teaching technique with other Biology topics.
- Undertake a similar study in different Districts and increase the number of mixed sex Schools to ensure increased validity and reliability.
- Explore the effectiveness of Story telling across all levels of education.

- Explore the use of Storytelling in teaching and for assessment in other Science subjects such as Physics and Chemistry.

5.2 Recommendations for Policy and Practice

- The Ministry of Education to budget for seminars and workshops to enlighten teachers on the importance of using entertaining teaching strategies such as Story telling in the teaching and learning process.
- The Ministry of Education to formulate policies that mandate school managers to organize local seminars for continuous professional development of their teachers on teaching and learning based on empirical research evidence.
- Teachers to engage in action research in order to base their practices on empirical evidence.
- Teachers to incorporate a variety of teaching strategies in their lessons in order to cater for the diverse needs of learners.

REFERENCES

- [1] Adunola, O., (2011). "The Impact of Teachers' Teaching Methods on the Academic Performance of Primary School Pupils in Ijebu-Ode Local cut Area of Ogun State," Ego Booster Books, Ogun State, Nigeria.
- [2] Ausubel, D., (1968). *Educational Psychology: A cognitive view*. New York: Holt, Rinehart and Winston Inc.
- [3] Aziz, T., and Rahman, A., (2015). *Effect of Concept Mapping Strategy on Students' Achievement in Science at Secondary Level*.
- [4] Amedu, O. I., (2015). *The effect of gender on the achievement of students in biology using the jigsaw method*. Journal of Education and practice 6(17).
- [5] Bervins, S., and Brodie, M., (2005). *A study of UK secondary school pupils' perceptions of Science and engineering*. Available at <http://shura.shu.ac.uk/956/1/fulltext>.
- [6] Collins, A., & Stevens, A. L. (1983). A cognitive theory of inquiry teaching. In Reigeluth, C. M. (Ed.), *Instructional-design theories and models*. Hillsdale, NJ: Lawrence Erlbaum.
- [7] Cimer, A., (2012). *What makes Biology Learning Difficult and Effective Students' Views?*
- [8] Curriculum Development Centre, (2000) *High school biology syllabus*. Lusaka; Ministry Of Education.
- [9] Cheema .A. B, and Mirza. S. M., (2013). *Effect of concept mapping on students' academic achievement*. Journal of Research and Reflections in Education 7(2), 125 -132. <http://www.ue.edu.pk/jrre>.
- [10] Cohen, L., and Morris, K., (2008). *Research Methods in Education*. Sixth Edition. New York: Routledge.
- [11] Education Research and Reviews Vol, 7 (3), pp.61-71 <http://www.academicjournals.org/ERR>
- [12] Examinations Council of Zambia, (2015). *2014 Chief Examiners Report*. ECZ: Lusaka.
- [13] Eldredge, N., (1998). *Life in the balance: humanity and the biodiversity crisis*. Princeton. University Press, Princeton, New Jersey, USA
- [14] Csikar C & Stefaniak E. J (2018). The Utility of Storytelling Strategies in the Biology Classroom contemporary educational technology, 9(1), 42-60. Old Dominion University, United States
- [15] Fatokun, K.V.F, & Odagboyi, I.A., (2010). *Gender Disparity and Parental Influence on Secondary School Achievement in Nasarawa State, Nigeria*. Journal of Research in National Development. [Http://www.transcampus.org](http://www.transcampus.org)
- [16] Ghosh, B.N., (2006). *Scientific Method and Social Research*. New Delhi: Sterling Publishers
- [17] Gin, E.K., (2011). *Gender and Politics in Nigeria: Lessons and Challenges for the Nigerian*
- [18] Heppner, F. (2007). *Teaching the large college class: A guidebook for instructors with multitudes*. San Francisco: Jossey-Bass.
- [19] Hopfer, S. (2012). Effects of a narrative HPV vaccination intervention aimed at reaching college women: a randomized controlled trial. *Prevention Science: The Official Journal of the Society for Prevention Research*, 13(2), 173-82. <http://doi.org/10.1007/s11121-011-0254-1>
- [20] Manda, K. (2012). *Learning Difficulties Grade Twelve Pupils Experience in Biology*. The Case of Selected High Schools in Sanfya District.
- [21] Mavrikaki , E., Koumparou, H., and Kyriakoudi, M., (2012). *Greek Secondary School Pupils' Views*. International Journal of Environmental & Science Education Vol. 7(2).
- [22] Muzumara, P.M., (2008). *Becoming an Effective Science Teacher*. Second Edition Bhuta Publishers-Lusaka.
- [23] Novak, J. D., and Gown, B., (1984). *Learning how to Learn*. Oxford: Cambridge University Press.
- [24] Osborne, J., Simon, S., and Collins, S., (2003). *Attitudes towards science: a review of the literature and its implications*. International Journal of Science Education, 25: 1049-1079. <http://dx.doi.org/10.1080/0950069032000032199> .
- [25] Sullivan. G.M and Artino. A.R., (2013). *Analyzing and Interpreting Data from Likert Scales*. Journal of Graduate Medical Education Vol, 5 (4): 541-542.
- [26] Sungur, S., & Tekkaya, C., (2003). *Students' achievement in human circulatory system unit: the effect of reasoning ability and gender*. Journal of Science Education and Technology, Vol.2(12): 59–64.