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Teaching and Learning of Environmental Science at Primary School Level: A Constructivist Approach in Cluster 22, Masvingo, Zimbabwe

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Abstract

The main purpose of this research was to explore the role of constructivism in teaching and learning of Environmental Science at Primary level in Zimbabwe. The study embraced both qualitative and quantitative research procedures). The design was however, more qualitative than quantitative, leading to a descriptive survey. The empirical data was collected from five primary schools in Masvingo District. The study sample comprised twenty(20) primary school teachers, ten(10) administrators and twenty(20) learners from Grades 6 and 7, bringing the total sample to fifty (50). A stratified sampling procedure was used to select participants. Data were collected through interviews, open-ended questionnaires and focus group discussions. The study established that learners are active in the construction of new knowledge. The findings also emphasized that instructional design also has negative effects on both the researcher and learner. Some teachers claimed that the constructivist approach was time consuming since they were supposed to prepare learners for examination oriented system. This has led teachers to face a number of challenges when using the constructivist teaching and learning strategies. The researchers concluded that the role of the teacher in the implementation of constructivism is very important because teachers monitor and guide learners. The teacher should teach from the learner's culture and background in order for the learners to understand and construct knowledge better. The curriculum developers need to develop a curriculum with clear goals and content in order to enhance the teachers' capacity in the constructivist approach. The government and other stakeholders should provide teaching and learning materials such as laboratories, apparatus and textbooks needed to enhance learning.

Keywords: Zimbabwe; Masvingo District; Education; Constructivism; Teaching and learning; Primary School; Environmental Science

Introduction

The concept of constructivism has become popular with some educators. In the constructivist classroom, the teacher's role is to prompt and facilitate discussions. The teacher's main focus should be on guiding learners by asking questions that lead them to develop their own conclusions on the subject (Chen, 2001). Palmer (1997) in Santrock (2009) suggests that good teachers join self, subject and learners in the fabric of life because they teach from an integral and undivided self. They manifest in their own lives and evoke in their learners, a capacity for connectedness. This means the teacher makes an effort to understand their learners' pre-existing conceptions and use active techniques, such as real world problem- solving and experiments to address learners' conceptions and build on them.

Constructivism is a radical departure from positivism in which learners help to formulate the problem being studied (Donald et al, 2010).It is radical because the philosophy in it has changed from tight control of the learner to full empowerment of the learner. According to Donald et al (2010) constructivism is an open-ended and democratic relationship between the learner and the teacher, that is, the children question what the teacher

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is saying and construct reality. Piaget(1978 in Slavin(2010) suggests that children learn by expanding their knowledge which generate through play from infancy to adulthood and are necessary for learning. Donald et al (2010) support this view when they say results become more accurate when the learners are involved in the learning process.

In the classroom, the constructivist view of learning can point towards a number of different teaching practices. In the most general sense, it usually means encouraging learners to use active techniques such as experiments, real world problem solving to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. Richardson (2003) echoes that constructivism encourages learners to think for themselves and engage in critical thinking. Chen (2001) purports that constructivism approach is a practical guide to lively teaching that results in reading and writing for critical thinking. Zoller (2000) alludes that constructivism approach explains and demonstrates a well-organized set strategies for teaching that invites and supports learning. At the same time, constructivism helps the teachers to form judgement about their teaching so that they can adjust their practices to different subjects.

According to Yore (2001), the traditional positivism classroom resembles a one person show with a captive, but largely uninvolved audience. Zoller(2000) states that the traditional positivist classes are usually dominated by direct instruction. The idea is that there is fixed body of knowledge that the learner must come to know. According to Yore (2001) in traditional positivism approach, learners are expected to blindly accept the information they are given by the teacher. The teacher is the one who transfers thoughts and meaning to the passive learner leaving little room for learners to initiate questions.

In a constructivist classroom, the teacher serves as a guide rather than as a disseminator of knowledge (Hanley, 1994).According to Levin (2003), constructivism encourages learners to develop meta- cognitive skills such as problem solving skills and reflection which allows them to think independently. This allows the learner to learn on their own. This will be of benefit to the learners when they are required to acquire skills outside the classroom. However, these skills help learners to assess their thoughts pattern to find out if they are learning most effectively.

Constructivist teachers focus more on learning through activities rather than learning from textbooks (Non-destructive Testing Resource Centre, 2009).The main activity in a constructivist classroom is solving problems. The learner uses inquiry method to ask questions, investigate a topic and uses a variety of resources to find solutions and answers (Levin, 2003).

An important element of teaching using the constructivist learning model is prior knowledge (Atherton, 2009).According to the Educational Broadcasting Corporation (2004) learners' fit new information into their existing knowledge. The teacher finds out what the learners already know including any misinformation and plans activities and experiments that will lead to add or refine the information they already possess. On the other hand, learning in traditional method, is based on repetition.

A research study was carried out by Audrey Gray (1984) at Saskatchewan. Gray was a teacher who acquired a constructivism theory of teaching in his careers. He experimented with a variety of instructional forms making learners active agents in the learning process. The learners were able to build and create knowledge and meaning by questioning and make associations with the prior knowledge to reach new understanding. In his classroom, children centre stones, written work were used to decorate the classroom. In one corner were a mobile and a tree. The tree was a museum to house important information to be learnt by the children

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in group work. It was found that constructivist teaching and learning with all the activities stated in the research was very effective and learners were able to construct knowledge. This has motivated the researcher to explore the role of constructivism in teaching and learning processes.

At primary school level, there are a number of subjects taught namely Mathematics, Shona, English, Religious and Moral Education, Social Studies, Environmental Science, Home Economics, Art, Music, Health and life Skills and Agriculture. Teachers employ different approaches in teaching these subjects. They use traditional methods which are teacher-centred and the current method of teaching which is learner-centred. Most educators are shifting from the traditional method to constructivism. Constructivist teaching and learning strategies involve the learner actively in the learning process. This seems to be effective when teaching practical subjects such as Home Economics, Art and Agriculture. The placement of Environmental Science at the periphery of learning at primary school level has created a strong desire in the researcher to investigate the role of constructivist teaching and learning strategies in teaching Environmental Science at primary school level.

Major Research Question

What is the role of constructivism in teaching and learning of Environmental Science?

Sub-Questions

- (1) Which teaching and learning strategies are prevalent in constructivist approach?
- (2) What are the teachers' views on the role of constructivism in teaching and learning?
- (3) How do learners respond to constructivist teaching and learning strategies employed by the teacher?

Theoretical Framework

The study covered perspectives in constructivist views of cognitive such as Jean Piaget, Levy Vygotsky and Jerome Bruner. According to Snowman (2009), one contemporary variation of constructivism is an outgrowth of Piaget's ideas because it focuses on the cognitive processes that take place within individuals. In other words, a learner's conception of the truth of some matter is based on his/her ability, with guidance to assimilate information effectively into existing schemes and developed new schemes and operations (Windschitl, 2002).

The other constructivist variation is known as social constructivism. It holds that meaningful learning occurs when learners are explicitly taught how to use the psychological tools of their culture for example language, approaches to problem-solving and are then given the opportunity to use these tools in authentic, real-life activities to create a common or shared, understanding of some phenomenon (McInerney, 2005). The theories become informants when the researcher viewed the problem. This study is centred on the role of constructivism in teaching and learning of Environmental Science at Primary school level in Masvingo District.

Research Methodology

Research design

There are two types of research paradigms which are used in research studies namely qualitative and quantitative. The researchers adopted a mixed research paradigm. Most of the qualitative procedures were augmented by quantitative procedures in the form of descriptive statistics covering pie charts, frequency tables and graphs in the analysis. The research design then became a descriptive survey. According to Sidhu (2003), a descriptive survey is an

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investigation technique which concentrates on describing and interpreting the existing phenomena in the form of views and beliefs. The descriptive survey research design has proved to be important in generating relevant information in exploring the role of constructivism in the teaching and learning of Environmental Science.

Population and sample

The population of interest to this research was drawn from learners, teachers and heads of schools from the five primary schools in Cluster 22 Masvingo District. It was not possible to carry out the study using all members of the population from these five schools because of their numeracy, therefore a sample fifty participants was selected. A sample according to Shukla (2008) is part of a larger population which has been selected to be representative of a larger population. Cohen, Manion and Morrison (2010) regard a sample as a small proportion of a population chosen for observation or study and analysis. A sample therefore is a representative of a union whose characteristics are of interest to the researcher. Thus, in this respect a sample is a group of subjects chosen to represent Masvingo District learners, teachers and heads. The sample comprised of fifty (50) respondents made of the following twenty (20) teachers, twenty (20) administrators and twenty (20) learners from grades 6 and 7

Sampling procedure

From each of the five primary schools in the sample, the researcher used the probability sample known as the stratified sampling method to generate the sample. Crawshaw and Chambers (1994) in Chiromo (2006) define stratified sampling as a sampling method in which the population is divided into district layers or strata which are non-overlapping. Each stratum is usually proportionally represented in the sample (Crashaw and Chambers, 1994).The researcher divided the schools into strata or discrete groups for example males and females. Random sample within this group was selected.

In other words other groups, a random population selection of each group was done. Stratified assures that certain sub-groups in the population are represented. A stratified sampling guarantees representation of defined groups in the population. A stratified random sample is, therefore a useful blend of randomization and categorization, thereby enabling both a quantitative and qualitative piece of research to be undertaken.

From each of the five primary schools from Cluster 22 Masvingo District, the researcher selected two administrators, four teachers and four learners bringing the total to ten respondents per school. This means that ten respondents were taken from each school, bringing the final sample size to fifty (50) members. Purposive sampling was used to arrive at four teachers, two administrators and four learners at each school. The justification for using purposive sampling was to ensure that the sample constituted teachers, administrators and learners from Grade6 and 7 from which relevant information was bound to be found (Chiromo, 2006). The composition of the respondents is summarised in table 1 below.

Table 1: Composition of Respondents (n=50)

School	A	B	C	D	E	Total
Teachers	4	4	4	4	4	20
Administrators	2	2	2	2	2	10
Learners	4	4	4	4	4	20
Total	10	10	10	10	10	50

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Research instruments

The researcher used three instruments to collect data that was used to interpret the role of constructivist teaching and learning strategies. The instruments used were face to face interviews, open-ended questionnaires and focus group discussion. The instruments mostly used in descriptive survey are interview guides and questionnaire. The use of interview and questionnaire on a sample representing a population whose activities is to explore the role of constructivism in the teaching and learning of Environmental Science. This enabled the researcher to collect data in a short time. Focus group discussion as an instrument was used to describe the role of constructivism in teaching and learning Environmental Science at primary school level where interviews and questionnaires were used.

Triangulation

According to Nyawaranda (2003) triangulation is the use of various sources of data; research instruments usually enhancing the reliability and validity of the research design. Cohen, Manion and Morrison (2010) intimate that triangulation is the basis upon which the validity and reliability of data can be anchored. Triangulation may be defined as the use of two or more methods of data collection in the study of some aspect of human behaviour such as interviews, open-ended questionnaires, observations and focus group discussions.

In this research study different data gathering tools such as interviews, open-ended questionnaires and focus group discussion were used so that similarities and disparities could be detected and accounted for descriptively. The relevant research information on the role of constructivism in teaching and learning of Environmental Science was collected using the aforementioned instruments.

Data collection procedure

The process of obtaining the schools and participants (administrators, teachers, and learners) involved three stages. The first stage involved writing to the Education officers to seek for permission to carry our research in the identified school. This is an important stage because nobody is allowed to go into schools and carry out any activity without written permission from the district education officer under whose control the school is.

The second stage involved a visit to the schools involved to introduce myself and explain the intention of my study. This also was very important because the researchers made it clear they were not coming to inspect the teachers, but to seek their perceptions, thinking, opinions and practices on the teaching of Environmental Science. The head teachers of the four schools assisted me in getting teachers and learners for interviews, open-ended questionnaires and focus group discussions. All the teachers who were approached agreed to participate in the study.

Stage one of the data collection involved distribution of questionnaires and collection of them after the teachers had completed them. Secondly, the researcher interviewed the individual administrators. The interviews were conducted in the schools and the administrators were free to choose where they would like to be; in the office or outside under a tree shade. This shows that the interviews were conducted in a natural setting and there was a positive interviewing climate between the interviewer and the interviewees.

Alternatively, the researcher could have collected the data by convening a meeting of all the administrators who were involved in the study. But according to Creswell (2009), removing the study participants from their natural settings lead to contrived findings which are out of context. Therefore the findings can be valid and reliable because the participants

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were not taken out of their context (Maykut and Morehouse, 1994 in Chiromo, 2006). The time used to interview one respondent ranged from thirty to forty minutes, in order to capture the verbal interactions of the teachers.

Lastly, the researcher had focus group discussion with learners from Grade 6 and 7. The group consisted of four members from each school. All in all, they were twenty learners/respondents, two females and two males. The language which was used in the discussion was the mother language Shona which is the medium of instruction in the primary schools. The mother language was chosen because most learners can freely express themselves in Shona but not in English although they might be fluent in English.

3.13 Ethical Considerations

According to Chiromo (2006:10) ‘Research ethics are the principles of right and wrong that guide the researchers’. The researcher considers ethical principle such as confidentiality, informed consent, anonymity and privacy. Confidentiality required that the researcher must not disclose information supplied by the respondents unless prior permission is sought and granted (Chiromo, 2006).

Privacy complement confidentiality and it stipulates that the participants’ privacy should be respected. Anonymity requires that the name of the research participants must not be divulged especially during the data analyses and discussion stages. Alphabetical letters and numbers were used to identify the school teachers and administrators. The researcher informed the respondents of the research procedure, the purpose of the study, the risk to be involved and the rights during and after research study (Chiromo, 2006).

The Results and Discussion

A thematic data analysis procedure was followed.

Theme1: Impact of Constructivism teaching and learning strategies to the learner

The following questionnaire items were meant to explore the impact of constructivist teaching and learning strategies to the learner. Below is figure 1, which indicates the responses to teachers regarding their knowledge on constructivist teaching and learning strategies to the learner.

Results from Questionnaire for Teaching (n=20)

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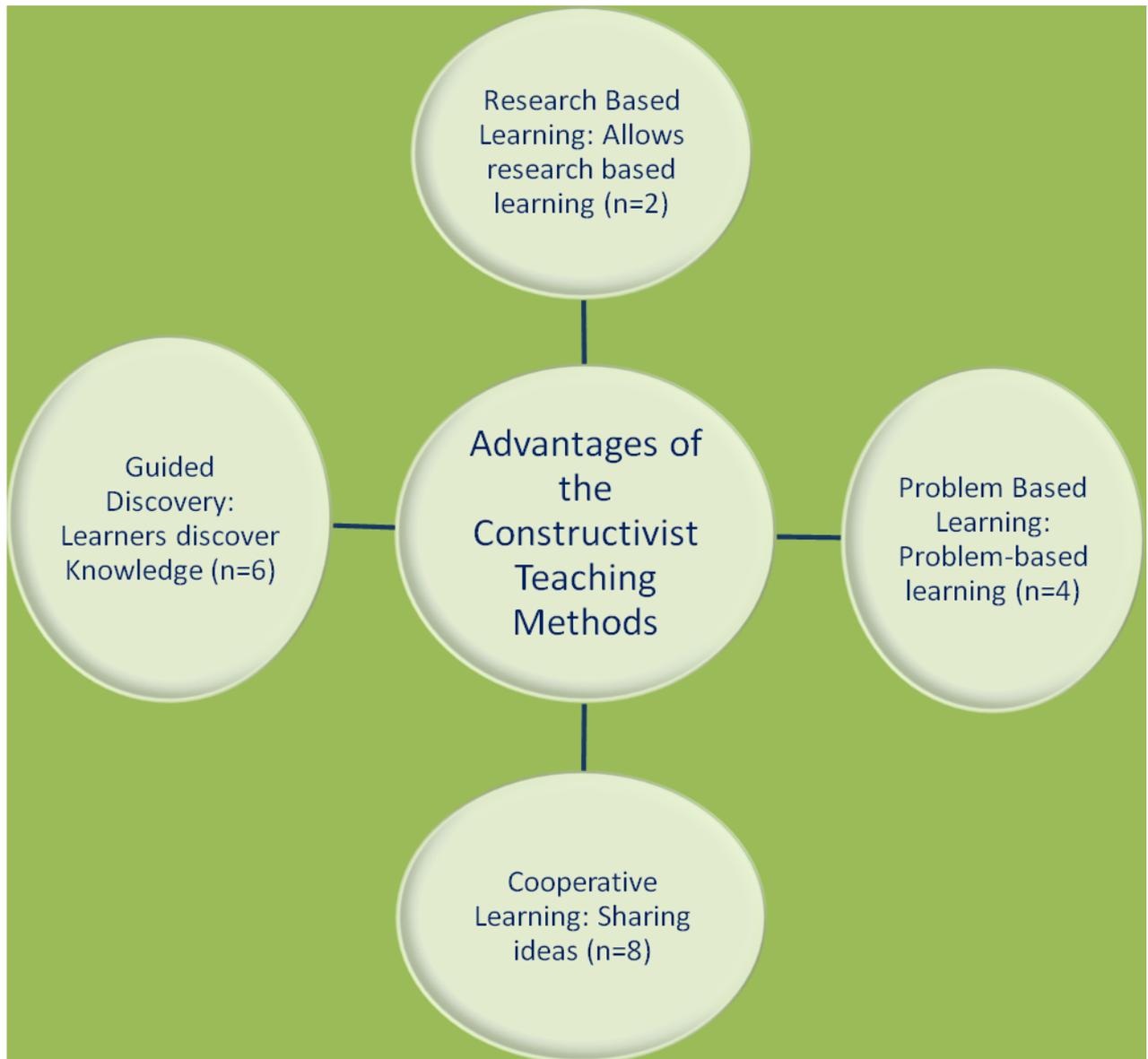


Figure 1: Advantages of Constructivist teaching methods (n=20)

Figure 1 above, shows the advantages of constructivist teaching methods which were given by the 20 participants as follows:

- Forty percent (40%=8) of teachers indicated that in co-operative learning learners share ideas.
- Thirty percent (30%=6) of teacher indicated that in guided discovery learning, learner discover knowledge on their own.
- Ten percent (10%=2) of teachers pointed out that research based learning enables learners to carry out research on topics.
- Twenty percent (20%=4) of teachers indicated that problem based enables learners solve problems.

The above research findings tally with the idea that co-operative learning encourages learners to share ideas. This was supported by Boaler (2000) when he purports that co-operative learning enables learners to interact with each other and share ideas. Dewey (1938) in

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opposition to Piaget (1973) and VionGlaserfeld (1997) in Slavin (2012) believe that learning cannot take place solely within the individual child but through social learning. These ideas were backed by the findings from research study which was carried by Cottoral and Cohen (2003) to support that scaffolding is vital to learning. This study revealed that learners help each other and make learning effective.

It is also indicated in the findings that guided learning enables learners to discover knowledge on their own. These research findings were supported by Bruner (1996) in Santrock (2004) when he said hands on materials such as manipulative can be used in helping learners to learn through actions. This implies that when teachers apply guided discovery method in teaching and learning, learners will be able to discover new ideas on their own.

The research findings also indicated that problem based learning enables learners to find solutions to real-world problems on their own. This findings was supported by ideas of Limpman (2003) when he mentions that problem based learning is a learning process which causes learners to think deeply, shape knowledge and determine what the answers to the questions might be. It has been indicated in the research findings that research based learning enables learner to carryout researches on topics. This concurs with ideas of Brown and Campione (1994) in Slavin (2013) when they mention that research based learning enables learners to focus on topics, research on them and then share what they have learned with others. However, it has been revealed from the research findings that guided discovery, co-operative learning, problem based learning and research based method are constructivist teaching methods which can be used in Environmental Science to help pupils understand concepts.

Result from Questionnaire for teachers

Table 2: Strategies used in constructivism method of teaching (n=20)

Questionnaire Item	Yes		No	
	(f)	%	(f)	%
.Environmental Science primary syllabus recommends Constructivism	20	100%	0	0%
Carrying out experiments is very useful when teaching Environmental Science	16	80%	4	20%
Group work is an appropriate constructivist strategy in teaching Environmental Science	20	100%	0	0%

Table 2 above, shows that 100 % (20) of the teachers agreed that constructivism approach is recommended by the Environmental Science primary school syllabus. This may suggest that a greater portion of teachers in, Masvingo District use constructivism approach in teaching Environmental Science. This finding concurs with the ideas of Yilmaz (2008) when he says meaningful learning occurs within the real world tasks and learners grasp the concept when the real world is brought into the classroom situation.

Moreover 80 % (16) of the teachers backed the notion that carrying out experiments when teaching Environmental Science is very helpful. This was supported by Wardsmith (2004) when he says Hands on activities are recommended for teaching learners the operations appropriate to their level of development and learners will develop necessary problem solving skills. This agreed with Snowman (2009) who says exploration is essential in the learning process. Furthermore, Snowman (2009) backed the idea of experimentation by

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saying exploration is important since learners will build things, use the things, try them out and making them work, playing with them and try to answer questions about how they work.

Only 20 % (4) opposed this idea of experimentation saying it is time consuming. Bruner (1966:10) refuted saying ‘we know many things for which we have no imagery and no words, and it is very hard to teach to someone by the use of either words or diagrams and pictures’. This implies that concrete representations enable learners to develop a conceptual understanding of the concepts, as well as develop an understanding of future ideas due to exposure to intuitive situations (Bruner, 1966).

Experiments as a constructivist strategy

Some similar findings cropped from focus group discussion on the importance of constructivists teaching and learning strategies such as experiments. The researcher found out that children liked doing experiments in Environmental Science. The reasons given included that, doing experiments was fun, that they found out things and also they learn whilst enjoying themselves. One grade 7 pupil from school A from table 1 commented that: ‘*When I do experiments I could do things for myself which helps me to remember new things*’

A girl from the same grade from school D stated that: ‘*Practical Environmental Science is a better way to understand things rather than just writing them down*’

Even a ten year old boy from school C suggested that;

‘*Doing experiments encourages my mind*’

Learners therefore, were telling, the researcher how important practical, experimental Science was for their learning.

The findings from focus group discussion support the role of constructivism in teaching and learning. However, there are some challenges faced by both teachers and learners in implementing constructivism approach. Preparation for national Environmental Science tests in primary schools could also impact negatively on learners learning Environmental Science. Ponchaud (2001) reported that anxiety about performance in national tests sometime leads to excessive routine test preparation in the final years of primary school. Some learners who were in Grade 7 reported that it was boring and repetitive means of preparing for the national tests. They commented negatively on aspects of curriculum content which they found difficult such as:

The Flower-remembering parts, like ovule and ovary, I kept getting these terms mixed up (11 year-old girl from school C).

Forces-pushing, colliding, had to understand where the force is acting from (10 year-old boy from school A)

Evaporation- I was confused by all the long words, like evaporation, condensation (11 year-old girl from school B)

However, the findings from the learner in Focus Group Discussions indicates that doing experiments was fun, learners found out things and they learn whilst enjoying themselves.

In the literature review, group work has been found to be very useful in the learning and teaching process. The majority of the teachers in Cluster 22 in Masvingo District suggested that group work enables learners to discuss the material together in order to achieve deeper understanding. This was in agreement with Richardson(2003) ideas that learners must exchange ideas and learn to negotiate with others and to evaluate their contribution in a

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socially acceptable manner that is helpful in the real world since learners will be exposed to a variety of experiences in which they will have co-operate and navigate among the ideas of others. This tallied with findings of a study by Nicholas (1996) who established that co-operative learning was very effective than individual learning. The findings supports Vygotsky's view on the importance of group work ,social interaction and peer tutoring getting children to work in groups as Vygotsky suggests seems to improve the learners level of motivation and performance. However, when teaching Environmental Science the teacher should engage children in group work and allow time for exchanging of ideas(feedback)by the learners.

Theme 3: Learning Strategies in Constructivism method

Results from focus group discussion and interviews with administrators

Focus group discussion was conducted with the learners (n=20). The learners, indicated the following:

- Views about constructivist teaching and learning strategies.
- Seventy-five percent (75%=15) indicated that they have Environmental Science learning centres.
- Seventy-five percent (75%=15) indicated that they enjoy learning in groups.
- Hundred percent (100%=20) learners pointed out that they take care of the learning centres in their classrooms.

Findings from group discussions indicated that 75 %(15) of learner have Environmental Science learning centres in their a classroom. This is to some extent, agreed with the research findings of San Francisco State University web which suggested that teachers interact with the learners and moderate the learning environment. For instance, creating learning centres within the classroom so that learners explore on their own. Twenty five percent (5) of the learners indicated that notion.

A very large portion of learners, 100 %(20) indicated that they participate in taking care of the learning centres. By so doing learners would feel part and parcel of the learning process. This agreed with the constructivist model which was developed by Rogoff (1998).In this constructivist model it was pointed out that novice learner's work with the teachers and more experienced peers in collaborative problem solving, activities to acquire skills they are not able to acquire while on their own.

Some findings from the interview for administrators which were similar to the findings obtained from the focus group discussion of learners indicated that learners enjoyed doing activities in Environmental Science lesson while they are in groups. One learner from school D, who was 9 years said, "*I enjoy learning in groups because we share ideas with other group members*". Some of the learners 75 % (15) claimed positively to group work. It can be stated that during group work activities, learners are actively involved in the learning process. They acquired their own knowledge and have the opportunity to concentrate on producing new knowledge. During the discussion the children revealed that they actively participate in group work and as a result of their interaction with their classmates they keep the statements and examples of their friends more in their minds and learnt the words more permanently.

Brown (1996) supported the findings got from focuses group discussion by saying constructivist instructional environment helps learners gain the habit of working collaboratively and makes it easier to concentrate on the subject area, For Demirel et al cited by (Erdem, 2001), constructivist instructional environment is an instructional environment in

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which learners enjoy group work, gain responsibility, share ideas, do exercise on the subject and participate in the class actively. This is to some extent, agreed with the research findings of Tezai and Guro I(2002) which suggest that constructivism could be used as either as a syllabus design or an instructional design because it helps the learners to work collaboratively and to produce new knowledge.

A very large proportion of learners indicated that they had science corners in their classroom. One learner out of school D who was a female said: *“we have a Science Corner in our classroom and we get items from the environment, I am in charge of it.”* In support to this statement, Piaget in Snowman (2009) suggests that teaching should focus on helping learners to develop schemata that would enable them to understand and explain phenomena in the world around them. This helps the learners to understand the concept well. One of the learners said;

‘I understand the concept by doing for example conducting experiments in Environmental Science’.

A significant number of learners showed that practical’s or experiments were interesting ways of learning Environmental Science. They make learners understood better and enable them to construct their own knowledge when actively involved in the learning process. Boaler claimed that engagement of learners in a lesson plays an important role in learners’ understanding and application of ideas. It has been revealed from the research findings that manipulative can provide learners with opportunities to connect ideas to previous ideas through concrete images, thus creating a basis for long-lasting understanding of meaning. Real-objects like at the science corner can increase learners’ mental imagery, resulting in an easier acquisition of learning. This concurs with Sharp’s (1995) research findings which reported that usage of models, real objects and experiments resulted in higher performance, mental images and long term memory and understanding. Learners could solve problems and provide answers without problems.

The research findings indicated that teachers were giving their children home work in Environmental Science. Fifty five percent (55%=11) of the learners were given home work which enabled them to acquire different knowledge from other people at home and as a result understand the concept better. Vygotsky (1978) in Fieldman (2009) assert that culture is a conceptual tool handed down to learners by more intellectual advanced peers, teachers or parents. According to Fieldman (2009) Vygotsky emphasised that the culture in which we are raised affects our cognitive development. With such beliefs and views, the researcher can agree that the knowledge from more knowledgeable people can help the learner understand the concept in a better way. This tallied with the findings of Rowe and Wertsch (2002) who established that parents and school shape children’s thoughts processes to reflect that which the culture values even if the individuals are by themselves. Therefore, constructivist teaching is needed for effective learning to take place.(Scaffolding).

Constructivist teaching and learning method is of benefit to the learner 90 %(9) the administrators indicated that constructivist teaching and learning methods is a long way towards sharpening the learners understanding. During the interview sessions, some administrators revealed that education works best when it concentrates on thinking and understanding rather than on rote memorization. However, constructivism concentrates on learning how to think and understand.

Most of the administrators believed that there is a link between traditional and constructivism method of teaching 90 % (9) of the administrations expressed strong feeling that there is a link between constructivism and traditional method of teaching. By the findings

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of Sahin’s study (2007) which suggested that constructivist instructional design is more effective than the traditional design, another study by Wolf (1994) proved that learners experience meaningful learning by constructivist design. It has been observed by Caprio cited by Hanley (2000) that by constructivist design learners participate in the class with pleasure and responsible for their learning. Another teacher from school D also spoke strongly in favour of constructivism as a teaching approach by saying:

Learners come to school with existing knowledge from their culture and background. We should build knowledge on the learner’s existing knowledge in order for the learners to construct new knowledge and learn meaningfully.

Lastly, 100 % (20) of the teachers backed the notion that the teachers should change items of the science corner and charts regularly for the learners to acquire new knowledge. This agreed, with the findings of Moch (2001) who conducted a research study and established that items in learning centres, charts and task cards should be changed regularly to encourage learners to construct new knowledge.

Theme 4: Role of Constructivism in teaching and learning

Teachers responded to questionnaires items which were meant to explore the role of constructivism in teaching and learning process. Below is Table 6, which shows the teachers responses to items which solicit responses to items regarding the importance of constructivism as a teaching and learning approach.

Results from Questionnaire for teachers, section B:

Table 3: Learning Styles in Constructivist teaching and learning strategies (n=20)

Questionnaire Item	YES		NO	
	(f)	%	(f)	%
1.In Constructivism: Learners construct knowledge	20	100	0	0
2.Learners are active	20	100	0	0
3 Learners are reflective	18	90	2	10

The above table indicates that 100% (20) of the teachers supported the notion that constructivism makes learners construct their own knowledge and children understand concepts much better. This concurs with Sherman’s (1995) ideas which were cited in Richardson (2003) which suggested a main constructivist idea is that knowledge which is not knowledge about the world but it is a construct of the world. In other words this implies that knowledge is not a fixed object, it is a construct of the individual, understanding of the learners private experience about the object.

All the teachers agreed that learners are active in the constructivism approach. The research findings were supported by Zoller (2000) when he states that learners learn more and enjoy the process when they are actively involved, rather than being passive listeners. Lastly 90 % (18) acknowledged that learners are reflective in constructivism approach. This concurs with Karady (2007) when he says education works best when it concentrates on thinking and understanding rather than on rote memorization. However, the learners are likely to retain and transfer the new knowledge to real life situations. This suggests that teachers in Cluster 22 Masvingo District acknowledged the importance of constructivism in teaching and learning process.

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Most of findings from administrators interviews revealed that the use of constructivist teaching and learning strategies are important when delivering Environmental Science lessons. Eighty percent 80% (8) of the administrators expressed strong feelings of using constructivist strategies such as groups work, active involvement, learning centres to be of importance in the teaching and learning. The above research findings concurred with the views of Chen (2001) which insist on the use of inquiry based learning activities with which learners test their ideas and draw conclusions. Karady (2007) claims that a constructivist teacher focuses more on learning through activity such as experiments, group work, field trips, outdoor activities and learning centres.

The contribution of administrators during interviews sessions also tallied with responses to questionnaire items as regards to the role of constructivism in teaching and learning. For instance a teacher school B said, *‘Constructivism is important in teaching and learning at primary level because learners actively construct meaning from their experts in connection with their prior understanding and the social setting’*

Results from the questionnaire for teachers, Section B

Table 4: Pupil- centred is a construction approach (n=20)

Variable	Yes		No	
	(f)	%	(f)	%
Pupil-centred approach	20	100%	0	0%

Table 4 above shows that 100% (20) teachers indicated that person-centred approach is a constructivism approach. To justify the above the 20 participants gave the following strengths and weaknesses of pupil-centred approach.

Strengths: Learners are actively involved in the learning process and this helps them to grasp the concepts; Learners construct knowledge; It encourages thinking and built the learners’ confidence; Promotes exchange of ideas and allows intellectual growth; Encourage cooperation among learners

Weaknesses: It needs constant supervision in order for it to be meaningful. It is time consuming.

The findings from the questionnaires for teachers (n=20) indicated that pupil-centred approach has more advantages than disadvantages and therefore should be used in teaching and learning Environmental Science at Primary level. The findings from the questionnaire from teachers indicated that person-centred approach enables learners to construct knowledge since learning is centred on the learner. Lave (1998) cited in Travers support the findings by pointing out that learners control their learning situation and think independently. Wadsworth (2004) alludes that Piaget’s approach can best be described as an example of learner-centred approach since learners can manipulate objects.

Conclusion

The researcher managed to use the data which was gathered to arrive at responses to the major research question and the sub-questions lastly, it was established that Cluster 22 Masvingo District primary school teachers generally employ constructivism method in teaching Environmental Science. The contribution of the respondents during interviews and responses to questionnaire somehow did not show what they actually do when conducting

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Environmental Science lessons. As far as administrators are concerned the researcher established that the administrators employ constructivist teaching and learning methods at their schools. Therefore, on the basis of the research findings the researcher claimed that the views of school administrators to constructivism approach were conducive to sound teaching and learning processes.

Factors such as qualifications of the teacher, gender, marital status and age were found to contribute to the teachers' experiences, knowledge and skills that are necessary for constructivist teaching and learning. The availability of resources was also found to have an effect on the teachers' responses on the use of constructivism in teaching and learning Environmental Science. The teachers and administrators claimed that the schools have sufficient resources which enables meaningful constructivist teaching and learning to take place. Concerning the type of approach used in teaching Environmental Science, the researcher concluded that both teachers and administrators preferred constructivist teaching and learning method to traditional method.

Recommendations

In the light of the findings of the research study, the researchers came up with a number of recommendations. These recommendations are meant either to stimulate more research, change the attitudes of relevant stakeholders towards teaching and learning practices to pupils. Teachers need to re-visit the major tenets of the constructivist theory to enhance their knowledge. This will help teachers to have a broader view of this theory and to see issues from other perspectives other than theirs only. Teachers need to consider learners' perspective in teaching and learning Environmental Science. Teachers should teach science from the learner's point of view. The researcher suggests that this allows learners to fall back on their pre-instructional, socio-cultural or indigenous experiences during their science knowledge construction processes. The teachers need to teach learners from their culture and background. The local authorities such as headmasters, senior teachers should regularly conduct staff development workshops and seminars which should remind and familiarise the teachers with the appropriate teaching methods for different subject areas. The policy makers could use constructivism as a syllabus design or an instruction design in Environmental Science. The researcher suggests that constructivism helps the learner to work collaboratively and produce new knowledge. In constructivist design, the teacher's qualifications have a great deal of importance since he or she is well versed with different theories. The researcher recommends the teachers to act as a guide and facilitator for learners in order for the learners to structure the knowledge. Constructivist approach is Science training, therefore the researcher recommends teachers and learners to engage in active construction of knowledge, by being involved in the learning process such as being involved in group work field trips and conducting experiments. Teachers need to look beyond the learners understanding of scientific concepts. The researcher recommends the teachers to teach fewer concepts when using the constructivism approach because learners need to grasp. Teachers need to improve on continuity across key stages and development of concepts, for example giving learners problems to solve on their own. Teachers need to create opportunities for learners to explore their ideas for example for creating learning centres and put some work to solve in their classrooms. The teachers should provide stimuli for learners to develop, modify and where necessary, change their ideas and views by creating a conducive classroom environment. Teachers to employ group work to facilitate sharing of ideas among learners. Other researchers can replicate the research study with a sample of teachers in the urban areas.

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