

CHAPTER II

REVIEW OF RELATED LITERATURE

2.0.0 INTRODUCTION

Review of related literature is one of the significant aspects of research. It enables the researcher to know the amount of work done in the concerned unknown and unexplored area. It is necessary that the researcher is aware of the knowledge generated and ongoing process of knowledge generation for a better clarity of the problem and insight into its methodological issues. For any researcher, review forms the basis for the problem under investigation and helps him / her to arrive at the proper perspective of the study. The implications for the present study have been drawn from the review of the related literature and presented in the end of this chapter.

2.1.0 STUDIES ON CONSTRUCTIVISM

Beeth et al. (1996) in their study of “Teaching from a Constructivist Paradigm: A way of Knowing and Learning or a case of Pedagogical Tricks” said that there is a wide spread acceptance that teaching from a constructivist paradigm require a learning environment, a set of teaching- learning strategies and method of assessment that differ significantly from those usually found in classroom that operate from a behaviorists theory or from an objectivist epistemology.

Lord (1998) in his study of “Cooperative Learning that really Works in Biology Teaching: Using Constructivist-Based Activities to Challenge Student Teams” offers guidance in the development of constructivist, inquiry-based activities within classes utilizing team learning. The researcher offers advice regarding the use of constructivist approaches for teaching in biology, cooperative learning, and the development of useful inquiry-sensitive curricula, the management of cooperative learning, and the grading of cooperative learning tasks, useful lecture questioning strategies were discussed.

Bolliger (2005) did study on, “Student learning in a Constructivist Multimedia-Rich Learning Environment.” The purpose of this study was to determine how students would perceive constructivist approaches in the classroom and their own learning.

The main findings of the study were: Activities were considered to be helpful in students' learning. All participants indicated the course activities had been helpful in their learning.

Fardanesh (2006) had studied “A Classification of Constructivist Instructional Design Models based on Learning and Teaching Approaches”. The objective of the study was to classify the constructivist instructional design models based on learning and teaching approaches. The sample comprised of 10 models from the population of 25 constructivist instructional design models that were identified as a result of conducting a comprehensive search in resources and data bases. The sample selection method used is Reputational-Case selection, in which reputational constructivist models are selected based on questioning from several experts in the field of instructional design; and as a result the following ten models were selected: 1.Participatory Design, 2.Anchored Cognitive, 3.Cognitive Apprenticeship, 4.Generative Learning, 5. Computer Supported Intentional Learning Environments(CSILE), 6.Discovery Learning, 7.Interpretation Construction (ICON) Design, 8.Mind Tools, 9.Problem-Based Learning (PBL), 10.Project Method. Findings show that none of the models has dual purpose teaching, learning approaches. In teaching and learning approaches, most of the models fall in the Individual category and only few models fall in the Group category with regard to teaching and learning approaches. The findings of the study showed that there are very few design models with socio-cultural approach, compared to models with social approach. Considering the design and development requirements of the models with socio-cultural approach, are more difficult than the other models. The social learning approach models with eight models in the column of individual learning approach are the most popular design models. This point shows that the socio-cultural approach has not penetrated the literature of the instructional design at an optimal level. The dual purpose column under teaching approach represents the models with high degree of applicability in all kinds of instructional situations. The models under group teaching approach seem to be suitable for all kinds of topics and subject matters. Finally, the models under individual teaching approach are most suitable for instructions with individual learning goals. The models with dual purpose learning approach might lead to deep learning objectives, especially the objectives related to social issues.

Kim (2006) had studied “The Effects of a Constructivist Teaching Approach on Student Academic Achievement”. One of the objectives of the study was to study the effects of a constructivist approach on academic achievement. The sample comprised of 76 VI grade students. The students were divided into two groups. The experimental group was taught using the constructivist approach while the control group was taught using the traditional approach. The finding shows that constructivist teaching is more effective than traditional teaching in terms of academic achievement.

Dogru and Kalender (2007) compared “Science classrooms using traditional teacher-centered approach to those using student- centered constructivist methods”. In their initial test of student performance immediately following the lessons, they found no significant difference between traditional and constructivist methods, however in the follow up assessment 15 day later, students who learned through constructivist methods showed better retention of knowledge than those who learned through traditional methods.

Karaduman and Gultekin (2007) had studied “The Effect of Constructivist Learning Principles based Learning Materials to Students’ Attitudes, Success and Retention in Social Studies”. The objectives of the study was to figure out the effectiveness of teaching materials, which were based on the principles of constructivist learning, with regard to the learners’ attitudes toward the social science courses, learner achievement and retention levels of the learners. The sample comprise of 72 Vth grade students in Sehit Ali Gaffar Okkan Elementary School in Eskisehir. Participants were divided into two groups: the control group (5-B) and the experimental group (5-C). The findings of the study were: The results obtained through this study show that teaching material prepared according to constructivist learning principles increase the academic success and retention levels of students in social studies courses. Also students have found the material prepared according to constructivist learning principles appropriate to constructivist learning.

Mccray (2007) had studied “Constructivist Approach: Improving Social Studies Skills and Academic Achievement”. The objectives of this qualitative study was to examine the relationship to constructivism as it relates to improving social studies skills and to determine whether constructivism is the best approach to take in improving social studies skills. The sample comprised of 25 teachers located in the

urban and suburban area of Southeastern, Michigan. The findings were constructivism approach to learning had proven to be most effective when improving social studies skills. The teacher also had fun implementing recommended strategies that would enhance their academic performance in their social studies class. These also provided teachers with constructive ideas that could be utilized to enhance their overall comprehension and academic performance in social studies. The teachers also agreed that their students learn best when they can relate to the subject matter. Majority of the teachers agreed that they currently use some form of constructivist activity in their classrooms. When asked, the teachers said that the teacher's role is to facilitate students learning by challenging a student's reality through active experiences and the creation of new ideas they all agreed. Furthermore, this research also provided teachers with constructive ideas that can be utilized to enhance their students' overall comprehension and academic performance in social studies.

Kang et al. (2007) had studied "Constructivist Research in Educational Technology: A Retrospective View and Future Prospects". The objectives of the study were to present issues and trends related to constructivism in educational technology manifested over the last decade and to identify and plot trends for the next decade. The findings of the study were learning sciences are basically rooted in the traditions, beliefs, philosophy, epistemology, and strategies of 'social constructivism'. In conclusion, constructivism, encompassing many specialized fields relevant to the topic of learning and is currently undergoing a wide and active evolution, and hence comes to terms with the learning sciences.

Chindgren (2008) did study on "Knowledge Sharing at NASA: Extending Social Constructivism to Space Exploration". The objectives of the study were: (1) To provide a brief overview of traditional learning and development efforts and the current knowledge sharing initiative. (2) To introduce the approach for incorporating information and communication technologies (ICT) to foster storytelling and sustain communities. The findings of the study were: Social constructivism theory had implications for human resource development at NASA. Today at NASA, the community of practice model of knowledge sharing refers to any joint enterprise that brings individuals with shared interests together; communities of practice are relationships of mutual engagement that bind members together into a social entity of communal resources.

Koseogluand (2008) had studied “Learner Friendly Textbooks: Chemistry Texts Based on a Constructivist View of Learning”. The objectives of the study were to investigate the effect of the use of an alternative science text created through the integration of some methods based on a constructivist view of learning in a quasi-experimental setting and to get some feedback from chemistry teacher about the use of this text as a textbook in class. The sample comprised of 80 chemistry teachers at Gazi University in Ankara. In this study, the use of inquiry methods, learning cycles, a conceptual change model and analogy in creating alternative science texts was discussed. The findings of the study were: Alternative texts did have some effect on students’ understanding. However, the text we have created did not show any remarkable effect on students. The mean of the control group’s knowledge scores was improved more than those of the experimental group’s knowledge scores but ANCOVA results showed that this was not statistically significant. The means of both groups’ comprehension scores were almost equally improved; no statistical significance was observed as a result.

Yorek et al. (2008) had studied, “An Investigation on Students’ Perceptions of Biodiversity”. The objectives of the study was to investigate pupils’ constructions of some concepts related to biodiversity like classifying living things, variation in living thing sand ecosystem elements, and the concept of life in the light of constructivist theory of learning. The sample comprised of ninth–grade students (n= 191) selected via cluster sampling method from the population and seven biology teachers teaching in these students’ schools. The population of the study was consisted of all the ninth–grade students attending secondary schools in a large province in city of Izmir–western Turkey and biology teachers working in the same province. Based on the constructivist approach, the study employed qualitative research Methods. The National Curriculum in Turkey was analyzed to determine students’ conceptual understanding level. According to this analysis, ‘Conceptual Understanding of The Living Things and Classification’ (CULC) test was developed. In addition, semi–structured interviews were carried out with seven teachers and 14 students to gather information about course structure and students’ conceptual understanding. The CULC based test tool was prepared .The following recommendations for a better environmental education and for making the next generations to understand the importance of biodiversity for a better future can be listed: the concept of biodiversity

should be placed comprehensively in biology and environmental education programs in order students to develop the environmental protection consciousness. The anthropocentric understanding of nature observed in students should be taken into account and in educational programs dissuasive activities for students to change their minds should be organized. The value of living things in the nature should be handled in the light of the harmony among all living things, not because of their harm or benefit to human beings in educational programs, while explaining the group of living things, instead of giving examples like the relationship between the living things and their effects to human health, Some other examples like the humans' congruence with the nature should be used. Based on the holistic understanding of nature observed in students, a new environmental education program, in which holistic and eco-centric consciousness is developed, should be developed. Environmental education courses in educational faculties should be reviewed, according to the new understanding. In service biology and science teachers, who are generally responsible for the environmental education, should be informed about the new understanding by means of in service educational courses.

Kok (2008) had studied “An Online Social Constructivist Tool: A Secondary School Experience in the Developing World”. The objectives of the study were to provide a picture of the role of Moodle for secondary school language teachers rather than making generalizations with regard to the use of Modular Object-Oriented Dynamic Learning Environment (MOODLE).The sample comprised of 20 participants. All 20 teachers were the foreign language teachers. Interviews were held in groups of 3 or 4 based on the availability of the teachers. Both structured and unstructured interviews were used in order to get more information about their experiences with MOODLE. With the rapid advances in technology, several online learning tools come onto the stage. Moodle facilitates online content creation and collaboration by entailing various social and communication tools that support teacher-student, student-student, and teacher-teacher interactions. This paper presents the “Moodling” experience within a secondary school in a developing country, namely Turkey. Based on a focus discussion group with the foreign language teachers, the author depicts the critical points that need to be taken into consideration so that an effective collaborative online platform for both teachers and students to learn together can exist. The findings of the study were: all the secondary school teachers interviewed stated their willingness to

participate in a virtual learning environment in addition to the traditional methods of teaching. The teachers also stated that through the interactions of their students with both the teachers and their peer's constructivist learning has been realized.

Ngambi et al. (2009) conducted a study on "ICT Mediated Constructivist Study for the Academic Support for Teachers". The focus of this research was to examine the effect of using an ICT tool to both increase academic support to students and teach critical thinking skills. The findings said that constructive approach aided by an anonymous web based consultative environment facilitates learning. The dynamics frequently asked questions (DFAQ) improved support to students and had an effect on students learning of project management and students acquired some questioning skills as evidenced in the examination performance.

Drexler (2010) had studied "A Networked Learning Model for Construction of Personal Learning Environments in Seventh Grade Life Science". The objectives of the study were to apply a networked learning model to the student construction of personal learning environments as a means of facilitating digital literacy and inquiry learning. The sample comprise of 96 seventh grade science students from 5 classes. A mixed method, design-based research case study was conducted to determine the processes students go through when constructing personal learning environments for scientific inquiry. The findings of the study were-students started practicing digital literacy, digital responsibility, organizing content, dealing with technology, collaborating and socializing, synthesizing and creating, taking responsibility and control for learning.

Bose (2010) had studied "Learning Collaboratively with Web 2.0Technologies: Putting into Action Social Constructivism". The objectives of the study were: (1) To determine whether teachers aimed to create scope for collaborative learning through assignments (2) To determine the reference of students towards individualized and team work. The sample comprised of 72 students and 24 teachers of 12 schools of New Delhi. Descriptive method was adopted, whereby data collected through a survey were interpreted. Twelve senior secondary schools of Delhi, affiliated to the Central Board of Secondary Education (CBSE) of India were selected. 24 teachers (two from each school) teaching in the upper primary level were included. Six students of the IX grade of each school were included so as to collect data on the

assignments carried out by them in the previous academic year i.e. when they were in the VIII grade. There were thus 72 students. Assignments given in English, science, social science, and math in which students were required to use ICT for data collection and processing were only considered. The tools used were-Questionnaire, Interview. The findings of the study were: The Internet was the first choice of all the respondents. The other sources mentioned were the newspaper, television, reference books and text books. 72% of the students had computers at home but only about 48% could access the Internet from home. Students without such direct access said that they visited cyber cafes and other places with the required facilities. All the students possessed basic skills -word processing, preparing power points and using the Internet. 92% of the students used social networking sites. None of them had used web (wikis, blogs and twitter) for creating/editing content. Only 15% of the assignments were meant for teamwork. But the students had discussions with their peers regularly even for the assignments meant for individual work.

Neo and Neo (2010) had studied “Students’ Perceptions in Developing a Multimedia Project within a Constructivist Learning Environment: A Malaysian Experience”. The objective of the study was to imbue students with multimedia project development skills over a 14-weeks, which culminated in an interactive group project that was multimedia and authored in Macromedia Director. The sample comprised of 53 students in their 2nd year of the degree course. Results of the study showed that by setting an authentic task, via a multimedia project, into a constructivist learning environment, students became highly motivated learners and active in their learning process and provided strong support and encouragement for Malaysian educators to incorporate multimedia technology and constructivist learning into their classrooms.

Narli and Baser (2010) had studied “The Effects of Constructivist Learning Environment on Prospective Mathematics Teachers’ Opinions”. The objectives of the study was to explore the effects of constructivist learning environment on prospective teachers’ opinions about mathematics, department of mathematics, discrete mathematics, countable and uncountable infinity taught under the subject of Cantorian Set Theory in discrete mathematics class. The sample comprised of 40 first-year students in the Division of Mathematics Education at the Department of Science and Mathematics in Buca Education Faculty at Dokuz Eylul University. The control group was taught by traditional methods, a teaching method based on a constructivist

approach was applied to the experimental group. Data were gathered by an open ended questionnaire administered to total 40 students, 20 from the each group. Collected data were evaluated through content analysis. The findings of the study were; there is no significant difference in the opinions of both experimental and control groups, pretest and posttest, in regard to the categories of mathematics, department of mathematics and discrete mathematics. Students do not find Department of Mathematics fun and they regard it very difficult.

Rajendran (2012) did “A study on Constructivist approach to Environmental Education among Primary Pre-service Student Teacher.” The researcher found that the constructivist classrooms facilitated student’s teacher and learners to develop better understanding on environmental concepts. He also found that student teachers and learners showed willingness to change ideas in the light of evidences. He further added that organization of learning resources is important for successful constructivist classroom.

Raval (2012) did a study on “Effectiveness of constructivist approach to the teaching of animal classification in science and technology of standard ninth.” The main objective of this study was to check the Effectiveness of Constructivist Approach to the Teaching of Animal Classification. For this study the ‘Achievement’ was selected as the dependent variable, and the ‘CIP’ was selected as the independent variable, according to the objectives of the study. The researcher had also selected the moderator variable ‘Sex’ to check their effectiveness on the dependent variable ‘Achievement’. After the manipulation of the program, the acquired data was analyzed and interpreted by the different statistical methods. The results obtained from the summary of the study and the other aspects of statistical calculations are as under.1. The effectiveness of the CIP was found considerable on entire sample as compared to traditional approach. 2. As compared to traditional approach the effectiveness of the CIP was found considerable on boys as compared to traditional approach. 3. The effectiveness of the CIP was found considerable on girls as compared to traditional approach.

Ravula (2014) did a study on “Constructivism and its approach of teaching social science at secondary level: a critical survey in Telangana region.” Some of the findings are1.Majority of the male secondary school social science teachers have

expressed that they are able to manage their classroom. Further, they stated that students usually seek permission from their teachers to leave the classroom. Students were assigned seating arrangement and the classroom activities were so organized to reflect the teaching in a student-centered environment. 2. Majority of the male and female secondary school students have expressed that they can think independently and generate the concepts than merely accepting their teacher's statements. They feel that every member in the class though they learn in the same classroom and taught by the same teacher but has different meanings for the same concept and also learn differently.

Mahesha (2015) did a study on "Effect of Social Constructivist Strategies on Achievement in Geography and Group Cohesiveness among Secondary School Students." The purpose of the study was to investigate the Effect of Social Constructivist Strategies on Achievement in Geography and Group Cohesiveness among secondary school students. The study also aimed to find out the correlation between the dependent variables of the study. The study was carried on students who were studying in eighth standard in schools of Mysore city. The sample for the present study consisted of 120 male and female students from two schools drawn using Random sampling technique. Data was collected using two tools: (1) Achievement test in Geography which was used to measure Achievement of eighth standard students in Geography. (2) Group Cohesiveness Scale used to measure the level of Group cohesiveness. The collected data was analyzed using independent samples 't' test, 2 way ANOVA and Pearson's Product Moment Correlation. The findings of the study revealed that the Social constructivist strategies of teaching had contributed significantly for enhancing Achievement in Geography and fostering Group Cohesiveness of secondary school students. However, the findings indicated that there is no significant differential effect of the treatment in male and female in Achievement in Geography and Group cohesiveness. The result also indicated that there was high positive relationship between Achievement in Geography and Group cohesiveness.

2.2.0 STUDIES ON LABORATORY EXPERIMENT

Apart from the discussed studies on constructivism, the following studies were also reported and presented related to laboratory experiments.

Switzer et al. (2000) in their study of “Mimicking the Scientific Process in the Upper-Division Laboratory: Bioscience”, discussed the implementation and assessment of inquiry-based learning strategies in their large lecture classrooms and associated labs. They presented an argument that the inclusion of such strategies aided student understanding of course content.

Hussein (2001) did study on “The Effect Of Laboratory Experiments On The Tenth Grade Secondary Students’ Achievement In Chemistry In Abyan Government In Yemen.” The sample of study consisted of 126 students divided into an experimental group and a control group. The study showed the experimental group students scored higher than control group students, due to the positive effect of laboratory experiments on the students achievement.

Dikmenli (2009) did study on “Biology Student Teachers’ Ideas about Purpose of Laboratory Work”. The researcher found that the aim of this study is to investigate biology student teachers’ ideas about the purpose of laboratory work in teaching biology. Data has been collected from 82 participating students using an open-ended questionnaire and analyzed using content analysis techniques. The results show that almost all of the student teachers considered laboratory work an integral part of teaching biology. However, participating students focused on the verification of theoretical knowledge and laboratory techniques as the main purpose of laboratory work. Furthermore, most of the participating students ignored the purposes relating to scientific process skills and the nature of science. These results are compared with related literature and recommendations are provided.

El Rabadi (2013) did study on “The Effect of Laboratory Experiments on the Upper Basic Stage Students Achievement in physics” This study investigates the effect of laboratory experiments on grade ten students’ achievement in physics. It answers the question: Is there any effect on the tenth grade students (male and females discretely) achievement that can be attributed to laboratory experiment? The sample of the study consisted of 130 Jordanian students. The experimental group students were taught physics in conjunction with laboratory experiments for forty five days. A thirty multiple choice item achievement test was designed to measure the student’s achievement .The study showed that the experimental group student’s achievement was higher than that of the control group students. The researcher recommends that

(1) it is necessary to use the laboratory experiments in teaching science, in general, and physics in particular, (2) the teaching schedule should include weekly classes for laboratory experiments in science, because this greatly enhances the student achievement in such topics. (3) Further similar studies involving different school stages and science branches like biology, chemistry and geology should be carried out.

Bethanie (2015) did a study on “The Importance of Laboratory Exercises in Biology Teaching; Case Study in an Ecotoxicology Course.” the researcher found that laboratory exercises can be conducted according to number of different designs, chosen based on the specific learning goals. Here, expository and explicit reflective laboratory designs are compared, with the framework of a master’s level course in Ecotoxicology with Physiological focus. Conclusions drawn from interviews with both teachers and students indicate that the explicit reflective laboratory design, with emphasis on student involvement the processes of natural science research including posing hypotheses, determining appropriate variables, data collection and analyses, and presentation of conclusions both written and oral, was preferred and more successful. Students were also able to gain a deeper understanding of subject matter and specific mechanisms, which are benefits normally attributed to the expository design. The above studies show that laboratory work has a positive effect on the students achievement. They recommend utilizing the laboratory in teaching science.

2.3.0 STUDIES ON EDUCATIONAL VIDEOS

Along with the studies on constructivism and laboratory experiments, the following studies were also reported and presented studies related to educational videos.

Singh (2010) conducted “A Study of Effectiveness of Multimedia Programme in Teaching Biology.” The study was conducted to develop a multimedia programme for the teaching of Biology, and experimenting the same with a set of students studying in the XIIth standard and finding out its effectiveness over the traditional method of teaching. Pre-test and Post-test equivalent groups design was followed for this study. The result shows that the students learning through multimedia programme are found to be better than the students learning through traditional method of teaching.

Aloraini (2011) did study on “The Impact of Using Multimedia on Students’ Academic Achievement in the College of Education at King Saud University.” The researcher designed an experiment of two equivalent groups, one of the groups was experimental & the other was control; each of them consists of 20 female students. The lecture was given to the first group using a computer presentation program which uses multimedia treated as an experimental group, while the second group was given the same lecture using the traditional method which uses the dialog & discussion technique treated as a control group. Both groups were subjected to pre & post-tests in the subject tackled by the lecture. The analysis result of the pre-test showed no statistically-significant differences, which in turn proves the equivalence of the two groups. Meanwhile, the analysis result of the post test showed the following: There are statistically-significant differences between the experimental group and the control group at a significance level of 0.05 for the interest of the experimental group.

Kumar et al. (2011) conducted a study “Teaching Grammar through Multimedia to Rural Secondary School Students”. Research evidenced indicates that the Multimedia presentation can improve student’s performance; therefore Multimedia presentation being an innovative approach to teaching-learning process endless drill and practice without repetition, and provides immediate feedback to the learner on his/her progress.

Willmot et al. (2012) did study on “Pedagogical Benefits of Using Video in Inspiring and Engaging Students” showed that there is strong evidence that digital video reporting can inspire and engage students when incorporated into student-centred learning activities through: increased student motivation, enhanced learning experience, higher marks, development potential for deeper learning of the subject development potential for deeper learning of the subject development potential for deeper learning of the subject, development of learner autonomy, enhanced team working and communication skills, a source of evidence relating to skills for interviews, learning resources for future cohorts to use, opportunities for staff development.

2.4.0 STUDIES ON JIGSAW

Along with the studies on constructivism, laboratory experiments and educational videos, the following two studies were reported and presented those are related to the use of Jigsaw.

Aranson et al. (2011) did study on “Cooperation in the Classroom: The Jigsaw Method.” They said that jigsaw technique is a cooperative learning technique in which students work in groups of 3-7. A unit is divided into 3-7 parts. Each group is assigned the same unit and each group member is asked to select one of the topics. Each member studies his or her own topics and then the members studying the same topic in each group assemble in “expertise group”. Having discussed the topic, they return to their own groups. They are required to teach one another what they have learnt. They are given an amount of time for this and are told that they will take an exam at the end of the time permitted. Students take both the teachers’ and students’ role. An atmosphere where everybody’s contribution is valuable is formed instead of one where a few students are dominant. Having learnt from one another will also reduce students’ tendency to believe that they are superior to others. This study aim to spot the differences between cooperative teachings conducted through the jigsaw technique and teaching conducted through teacher centered methods in terms of academic achievement, attitudes towards and self-efficacy in biology teaching and to reveal the views concerning jigsaw technique held by students in the cooperative group.

Santosh (2012) in his study “A Comparative Study of Effectiveness of Student – Team Achievement Division (STAD) and Jigsaw Methods of Cooperative Learning” revealed that STAD and Jigsaw contribute towards raising the academic achievement and self-concept of students in contrast to traditional methods. The group of students taught mathematics through STAD and jigsaw methods showed a significantly higher mean and mean gain scores on the academic achievement and self-concept than the group of students taught through traditional method at the end of experimental treatment. Jigsaw showed a significant higher on achievement than STAD method under cooperative learning.

2.5.0 STUDIES ON FIELD WORK

Authentic sciences involves field work , creativity and inquiry. Research in education indicates that student learn best through active learning methods such as constructivism and project based learning . Research also points to fieldwork and hands on learning as possible ways to motivate students. Authentic sciences can increase knowledge and achievement in the nature of science which is requisite for scientific literacy .Thus review of literature surrounding fieldwork focused on how to conduct fieldtrips, traditional fieldtrips, fieldwork in natural settings, place based education, fieldwork related strategies, fieldwork and motivation, roadblocks to implementing fieldwork. Fieldworksare positively correleated to student achievement and motivation.

Meagan (2011) did a study on “Connecting Field Trip and Classroom Learning: Evaluating the Utility of a Museum based Framework in an Environmental Education Context.” The researcher found that Field trips have been shown to be more effective when they connect with classroom learning.

Shakil (2011) did a study on “The Need and Importance of Field Trips at Higher Level in Karachi.” The researcher identified the importance of educational field trips at higher level in different universities of Karachi. This study was carried out through survey. The population of this study was the students and teachers of both government and private universities. The ideas and views of male and female students and teachers were sought out regarding the importance of educational field trips at higher level. One hundred and fifty respondents including 50 teachers and 100 students were randomly selected. The questionnaire was used as a research instrument which was consisted of 28, 28 items, collected data was analyzed by using simple percentage method. Majority of the respondents had a view that educational field trip is helpful to cope up with advance learning. A large number of respondents opinioned that educational field trip help to give a practical approach for the curriculum and it is helpful to develop more interest in learning among students.

Behrendt et al. (2013) did a study on “A Review of Research on School Field Trips and their Value in Education.” The researchers had concluded that field trips offer an opportunity to motivate and connect students to appreciate and understand classroom

concepts, which increase a student's knowledge foundation, promoting further learning and higher level thinking strategies. With understanding comes confidence and intrinsic motivation. A successful and quality field trip requires teacher preparation and interaction. Some factors should be addressed before the trip. The experience needs to be planned. The teacher should previsit the venue to meet the staff and arrange the activities, and then prepare the students by orienting them to the venue's layout, activities, and expectations. Student groupings should be set up prior to arrival at the venue. Chaperones need to be trained. The trip needs to connect to the curriculum, students should be actively engaged, and all students should be able to take part in the trip regardless of financial, physical or intellectual status. Teachers need to consider safety issues and should prepare to embrace the unexpected. On the day of the field trip, the teacher may hand the program to the venue's staff, but the teacher should remain involved, participating with the activities and guiding students when necessary. Perhaps the teacher's most difficult task is to allow the students freedom to experience the activities. Back at the classroom, it is imperative that the teacher spend sufficient and quality time to reflect on the experiences and help students build connections to the curriculum concepts. There is much to be learned from a vacant lot, the edge of a parking lot, a puddle, or a bush. Field trips can stimulate new learning, increased attitude towards science, trigger interest development, and provide many rewards to both the teacher and the students.

2.6.0 SUMMARY OF THE REVIEW OF RELATED LITERATURE

The researcher has reviewed researches both from India and abroad. Indian researcher like Santosh (2012) studied "A Comparative study of effectiveness of Student –Team Achievement Division (STAD) and Jigsaw methods of Cooperative learning".

Researchers like Beeth, et.al, (1996), Lord, T. (1998), , Switzer, P.V., & Shriner, W.M. (2000), Bollinger D. (2005), Fardanesh H., (2006), Kim J. S, (2006), Karaduman H. and Gultekin M., (2007), Mccray K.,(2007), Dogru M. and Kalender S., (2007), Chindgren T (2008), Koseoglu F. and Tasdelen U (2008), Yorek Nurettin al., (2008), Ngambi & Johnsyson (2009), Drexler W. (2010), Neo M. and Neo T., (2010), have discussed about various aspects of constructivism in teaching learning process.

The laboratory work positively affects students' scientific attitudes, thought and mental faculties supported by Switzer et al. (2000), Hussein (2001), Dikmenli M. (2009), Ensaf George Salameh El-Rabadi (2013), Bethanie C. A. (2015)

Teachers also need educational videos and games as well other educational materials in Biology class. Researchers like Singh, Y. G. (2010), Aloraini S. (2011), Kumar, K.S. Kiran (2011), Willmot et al (2012) have extensively work on various aspect of educational video , games and their effect on student learning.

Jigsaw technique play essential role in sharing information within and outside of group and it is supported by the work of Aranson et al. (2011) and Santosh (2012).

Phenomenal memory for facts and things seen and heard in strange surroundings and under unusual conditions strengthen student's learning through field visit supported by Megan C. L. (2011), Shakil A.F. (2011), Behrendt M. (2013)

2.7.0 IMPLICATION OF REVIEW FOR THE PRESENT STUDY

The review of the related literature reveals that many studies have been conducted in the area of Constructivism Beeth, et.al, (1996), Lord, T. (1998), , Switzer, P.V., & Shriner, W.M. (2000), Bollinger D. (2005), Fardanesh H., (2006), Kim J. S, (2006), Karaduman H. and Gultekin M., (2007), Mccray K.,(2007), Dogru M. and Kalender S., (2007), Chindgren T (2008), Koseoglu F. and Tasdelen U (2008), Yorek Nurettin al., (2008), Ngambi & Johnsyson (2009), Drexler W. (2010), Neo M. and Neo T., (2010), but the number of studies conducted in India were very few which provide opportunity for researcher to undertake research in the field of constructivism.

Studies conducted by Switzer et al. (2000), Hussein (2001), Dikmenli M. (2009), El-Rabadi (2013), Bethanie C. A. (2015) supported that laboratory work positively affects students' scientific attitudes, thought and mental faculties. It was also the intention of the researcher to include laboratory experimentation to construct the mental framework of student about plant and animal anatomy using unit II contents of Class XI Biology, CBSE due to its suitability for the purpose.

Researchers like Singh, Y. G. (2010), Aloraini S. (2011), Kumar, K.S. Kiran (2011), Willmot et al (2012) worked on educational videos and games and other educational materials in Science and Biology and proved their importance in teaching learning in classroom situations. In human and Plant physiology, it is very difficult to make student understand concept clearly by lecture methods only. So, to solve this problem

educational videos were planned to be used to provide virtual world about the functioning of various plant and animals' internal body organs.

Jigsaw technique play essential role in sharing information within and outside of group and it is supported by the work of Aranson et al. (2011) and Santosh (2012). In unit III of class XI abstract concept related to Cell structure and function can be easily understood by sharing knowledge among them which promoted researcher to adopt cooperative learning specially Jigsaw I & II to enhanced student level of performance. Strengthening student's learning through field visit was supported by the studies done by Megan C. L. (2011), Shakil A.F. (2011) and Behrendt M. (2013). Plant diversity, animal diversity of Unit I and Human Physiology of Unit V contents were most suitable from research's point of view to adopt field trip to facilitate learning of student and develop deep level of understanding.

All these studies have been conducted at different levels of schooling like primary, secondary, senior secondary and higher education. Many studies have been conducted in the past that attempted to characterize and assess the impact of active learning strategies upon student learning in large lecture settings. Some studies have concentrated upon interactive engagement strategies employing techniques to evoke individual participation in the lecture process, while others have examined the effects of cooperative or peer learning upon student performance. The researcher could not come across researches related to use constructivism strategy in biology teaching in the Indian context. Thus, a need was felt to carry out the proposed investigation.