CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1. INTRODUCTION

Review of related literature is important phase of research. “It establishes a theoretical framework for research, indicating the nature and state of the theoretical and empirical fields and important research that has been conducted and policies that have been issued, defining key terms, constructs and concepts, reporting key methodologies used in other research into the topic” (Cohen, Manion, & Morrison, 2011). So it gives direction to entire research work and assists in identifying the research gap and offers framework for subsequent research. Thus, Review of related literature considered as a heart of the research process and keeps research in track and help in finding of the possible research in the area of his/her interest.

Review of related literature creates framework and helps in following aspects

- Recognizing the previous studies in the area of interest.
- Identifying the research gap in a rational way.
- Selection of research topic based on the research gap.
- Narrow down the research problem.
- Fixing the variables of the research.
- Identifying the nature of research methodology for new research work based on the previous studies.
- Resolve the instrumentation and statistical tool of present research.
- Contribute direction for building new theory based on previous studies.
- Developing research or thesis writing skills.

In research process, based on nature of inquiry, research reviews are carried out in two ways i.e., basic literature review and advanced literature review. Basic literature review focus on arguing the current state of knowledge by means of summarizing and evaluation of previous studies. Its purpose is to identify the position of current knowledge. But advanced literature review identifies research gap and covers the uncovered research problem for further study (Machi & McEvoy, 2012).
From this background, based on nature of present study advanced literature review was adopted by refereeing the various literature sources for the present prevalent research work.

According to Wiersma and Jurs (2009) there are two approaches to carry out the review of related literature. The first one is straight to the internet approach and second is straight to library approach. In the former approach, resources are reviewed from the sources available on internet sources. Currently abundant research outcomes and library sources available on online mode and also in the form of online library. In later approach researcher directly visit the library and refers library sources. In research biosphere both approaches are important. The present study conducted by reviewing both the approaches. The researcher had reviewed sources from, professional national and international journals, books, edited books, encyclopedia, master and doctoral thesis, magazines and newspapers, conference proceedings, Ph.D. thesis, websites, government and technical reports etc.

By keeping the nature of present research topic, the literature reviews are listed under constructivist related studies, Jigsaw related studies, technology related studies and integration of technology related/technology based constructivist related studies.

2.2. STUDIES REALTED TO CONSTRUCTIVISM

Karaduman and Gultekin (2007) investigated “the effect of constructivist learning principles based learning materials to students’ attitudes, success and retention in social studies”. The main aim of the study was to examine the effectiveness of constructivist learning principle based learning materials and traditional approach on attitude towards Social Science course, achievement and retention level of the learners. The study adopted control-group experimental research model with pre-test and post-test design. The participants of this research were 5th grade students drawn from Sehit Ali Gaffar Okkan Elementary School in Eskisehir. The sample consisted of 72 students, who were classified into control group and experimental group and each group assigned with 36 students. For treatment of experimental group the investigator developed lesson plan as well as learning materials based on the constructivist learning principle centered learning material in
social science subject. And control group was taught using traditional approach. The tools used were demographic questionnaire, achievement test, questionnaire for collecting opinion about teaching and learning material, social science course attitude scale developed by Deveci and Güven (2002) in the study. SPSS package was used to analysis the obtained data. The findings of the study were there was no significant difference in pre-test scores of experimental group and control group. There was no significant difference in attitude of the students in social science in experimental group and control group before treatment. Compare to traditional approach the constructivist learning principles based environment was more effective. There was significant difference in the effectiveness of retention level achievement of experiment group and control group. The students accepted the constructivist teaching material as appropriate to determined constructivist learning principles.

Sridevi (2008) conducted Quasi-experimental non-equivalent pre-test and post-test design to explore “Effectiveness of constructivist approach on students’ achievement in science, scientific attitude and perception of nature of science at secondary level” Purposive sampling technique was adopted in this study. The sample consists of 8th standard students of demonstration multipurpose school and Kendriya Vidalaya located in Mysore of Karnataka. Revans progressive matrices, achievement test in science, perception natural science test, science process skills test, scientific attitude scale, attitude towards science scale, reaction scale and semi-structure interview were the tools used in this study. The investigator had developed 4 E’s based constructivism approach instructional material and taught in experimental group. And control group was taught on regular basics by the science teacher. After intervention post-test and other tools were employed to both students. For analysis and interpretation t-test, persons’ product movement correlation and analysis of covariance test were employed. The findings of the study were; constructivist approach was effective than tradition approach in improving the academic achievement in science, perception of natural science process skills, scientific attitude and attitude towards science. There was no difference in the impact of Constructivist teaching on boys and girls. The approach was found equally effective for both girls and boys in improving their achievement in science, perception of natural of science process skill and attitude towards science. There was significant difference in scientific attitude of girls and boys. There was difference in the attainment level of
objectives in control and experimental group. The constructivist approach was effective in fostering understanding and processing skills among the students. There was difference in development of various process skills as an effect of constructivist approach. There was positive relationship among achievement in perception of nature of science, science process skill, scientific attitude and attitude towards science with each other.

Solangi, Mughal and Qaisrani (2008) studied “the effect of constructivist Teaching Approach on the Achievement of Mathematics Students at Secondary Level”. The main objective of this study was examining whether constructivist abased instruction better than traditional approach in teaching of 10th class mathematics. The study adopted pre-test post-test control group design in the study. The Population of the study was 200 students of class X from government boys high schools situated in district Naushehro Feroz. The study was conducted on randomly assigned 30 students each for experimental and control group. In experiment procedure experimental group was addressed with constructivist teaching and control group with traditional approach. The total hours allotted for treatment for each group was 30 hour. MCQ based pre-test and post-test constructed by researcher was used to collect data pertaining to achievement in mathematics subject. SPSS package was used to calculate mean, SD and t-test. The findings of the study were; there was statistically significant difference between pre-test and post-test scores of experimental group and control group. There was significant increase in the mean scores of experimental group (N=30, M=38.683) compare to control group (N=30, M=26.973). Therefore constructivist approach was more effective than the traditional approach.

Ginsberg and Schulte (2008) conducted comparative study to known “the impact of conventional vs social constructivist view providing accommodation”. They used qualitative method to conduct this study. Implemented multiple case study approach in which data was collected from the different small group of university faculty. The sample constitute of faculty members of different departments of Midwest, public four year university. Purposive sampling method was adopted to get sample from the different department including business, health and human service, liberal arts, education and technology etc. To collect the data qualitative tools namely
semi-structured interview including open-ended questions and question to elicit perceptions and attitude of the teachers. Each faculty members were interviewed approximately for 60 minutes and recorded in the form of audio tape with prior permission. The study used Croswell guidelines for qualitative data analysis in terms of coding, processing and analyzing. The study found that; the faculty whose beliefs in the social constructivist view of students with disabilities espoused very inclusive ideas about how to educate the entire class, including those with special needs. In contrast, faculty who held a conventional view of students with disabilities viewed the educational practices for these students to be very separate from the whole of the class.

Zarei and Esfandiari (2008) conducted study on “the effect of constructivist vs. Conventional teaching on reading comprehension”. The study compared the effect of constructivist and conventional teaching in general English by keeping texts of reading comprehension. Pre-test and post-test two group design was considered in this study. The population of the study drawn from Azad University, Shahin Shahar Branch, Isfahan Iran and 180 students with age range of 18-20 were the participants. For controlling homogeneity TOEFL test was administered and based top 60 scored students were assigned to control group and experimental group. The tools used in the study were MCQ based pre-cloze test and post-cloze test, TOFEL test, multiple choice discrete tests, constructivist teaching on reading comprehension model, and traditional teaching on reading comprehension model. Constructivist model was developed based on Bybee 5 E’s instructional model where as traditional model includes reading out the text, explaining the necessary grammar points and giving vocabulary definitions. During experimentation investigator treated experimental with constructivist approach and control group with traditional treatment. The findings reveal that 1) there was no significant difference between the pre-cloze test and post-cloze test of the participants in conventional group in cloze test. 2) There was significant difference in the pre-cloze test and post-cloze test of constructivist in group 3) there was no significant difference in the pre-test and post-test mean scores of experiment group in multiple-choice discrete tests. 4) The study found that constructivist teaching was more effective than the traditional teaching in English language.
Demirci (2009) undertook a study titled “Is there any significant difference between the means of achievement and retention learning scores of constructivist learning approach applied group and the means of achievement and retention scores of conventional training approach in the lesson of science ‘Static Electricity’ unit?”.

In this study pre-test, post-test control group design was used to achieve the objective of the study. The sample comprised of 6th A and 6th B class of Yunus Emre Elementary school at city center of Eskisehir in spring term of 2005-2006. 6th A class and 6th B class was randomly assigned as experimental group and control group receptively. The study was limited 2005-2006 spring terms. For teaching experimental group constructivist learning approach was used on the other side for control group conventional method was adopted. Researcher prepared and developed pre and post academic achievement test on the topic Unit-static electricity was used. The study resulted that: Both constructivist learning group and conventional group were equal in their pre-test scores of academic achievement. After intervention the study found that Constructivist learning approach was more effective in improving post-test mean scores and retention scores of students in Static Electricity unit compare to conventional approach.

Loyens, Rikers and Schmidt (2009) conducted a study on “Students' conceptions of constructivist learning in different programme years and different learning environments”. To achieve the objective researcher had selected two universities of Netherland; Erasmus University, Rotterdam where problem based learning psychology curriculum was followed and second, Utrecht University where conventional psychology curriculum was adopted. The participants of the study were first year, second year and third year students. There were 424 students from Erasmus University and 519 students from Utrecht University took part in this study. The study developed and used the 55-item questionnaire to measure students’ conceptions of constructivist activity. A cross-sectional design was adapted to test three groups of students with two different curriculums. Two-way multivariate analysis of variance (MANOVA) was to analyze the collected data. The study found that: Results of the MANOVA showed significant differences on all dependent measures between the two learning environments [Hotelling’s $T^2=0.13, F(6, 1014) = 21.21, p < .01$] as well as among the different years of both programmes [Wilks's A = .87, F(12, 2028) = 12.02, $p < .01$]. Furthermore, a significant interaction effect was observed between different
programme years and both curricula [Wilks's A = .97, $F(12, 2028) = 2.91, p < .01$]. The interaction effect appeared only significant for self-perceived inability to learn. No significant differences were found between the three programme years on cooperative learning and motivation to learn. Significant differences were found between the first-year and the second-year students and between the first-year and the third-year students with respect to conceptions about knowledge construction and the use of authentic problems.

Bobola and Afolabi (2009) carried out a study on “effect on practices through guided discovery approach: the effect on students’ cognitive achievements in Nigerian senior secondary school physics”. The main objective of the study was to explore the effectiveness of guided discovery, demonstration and expository approach on achievement in physics subject. The study followed the non-randomize pre-test-posttest control group design. The study was conducted in 12 purposively selected co-educational secondary school in Ife Central Local Government Area of Osun State. The sample consisted of 852 senior secondary two (SS2) physical students. The final sample consisted 141 male students and 137 female students, totally 141 students participated in the study. The data collected through Physics Achievement Test (PAT) constructed and validated by the researcher, lesson packages developed by the researcher. The researcher had taken the help of research assistance to teach in each school. They were trained for week before intervention of package. Experimental group-1, experimental group-2 and control group were taught using discovery approach, demonstration approach and expository approach respectively. After treatment post-test was administered to all the groups. The ‘t’ test and ANCOVA were used in the study for data analysis. The findings of the study were 1) There was significant difference in achievement of students in physicals treated through guided discovery, demonstration and expository teaching. Effectiveness wise, discovery approach found to be more effective followed by pictorial organizer and expository approach found to be less effective and least effective respectively. 2) All the three approaches equally effective for both boys and girls in improving post-test achievement. 3) There was statistically significant ($F=265.71, p<.05$) difference in main effect of all the tree approaches. 4) Multiple Classification Analysis (MCA) indicated that 83 % of the total variance in the achievement of students in physics is
attributed to the influence of teaching approaches after being exposed to pictorial organizer.

Nayir, Yildirim and Kostur (2009) conducted a descriptive field study on “Pre-service teachers’ opinions about constructivism and to determine the different ideas among the pre-service teachers in different departments”. The study conducted in 2007-2008 spring semester on pre-service teachers of university of Ankara, Turkey. The sample consists of 312 pre-service teachers: among 83.3% of sample was female and 16.7% male. The sample also proper representation from elementary mathematics education (18.3), early childhood education (23.7%), primary education (20.5), Turkish Language Education (9%), foreign language education (12.5) and computer education and instruction (16%). Teacher sufficiency scale developed by the investigator was used to gather data. The instrument developed considered five factors related to constructivist learning to be exact student, setting the stage, dimension about teaching and teaching organization. SPSS 13 version used to for percentage score. The findings of the study were; the pre-service teacher expressed that 1. Pre-service teachers think that a constructivist teacher ought to be aware of the students’ needs and interests, social, emotional and socio-economical differences. 2. Lesson plan for teaching should address the need of the students. 3. Teachers know how to attain the attention of the students and to involve them in their environment. 4. Teacher also considers, objectives thought provoking questions, giving feedback and stick to the aim in the assessment process.

Bonner and Chen (2009) carried a study on “Teacher candidates’ perceptions about grading and constructivist teaching”. The study was conducted on students’ enrolled three years course of Hunder College, the City University of New York (CUNY). The sample includes teacher candidates of under graduate adolescent education, graduate adolescent education and graduate child education. The total 222 teacher candidates took part in final survey. The study developed and used SAB instrument and piloted during the I phase of the study. The study adopted factor analysis, percentage analysis and t-test to analysis the data. The study found that 1. Factor analysis indicated and finalized four factors namely F1 (Lax Approach to Grading) F2 (Academic enabling Approach Grading), F3 (Paper-and –Pencil-Tests) and F4 (Management Approach to Grading) based on the characteristic of items for
development of SAB (Survey of Assessment Beliefs) scale. 2. Correlation exists among the four SAB scale, constructivist Teaching (CT) Approach, Traditional Teaching (TT) Approach and Traditional Management (TM) Approach. 3. F2 was most strongly related with CT, F3 also related with CT and F4 was related with TT and MT. However F1 exhibited strong relation with paper-and-pencil test. 4. Most of the teachers confirmed the constructivist teaching approach. 5. There was significant difference in the elementary and secondary education teacher candidates with respect to grading and teaching attitude.

Bimbola and Daniel (2010) conducted a study on “the effect of constructivist-based teaching strategy on academic performance of students in integrated science at Nigerian junior secondary school level”. Quasi-experimental non-equivalent pre-test and post-test control group design used in this study. A random sampling technique was used to select the participants of this study. The total participants were 120 students from four public co-educational junior secondary school in Ijebu-ode local government, an Ogun state, South-west Nigeria. Intact class was identified from four schools, with in two classes from out of four schools was treated as experimental group and remaining two classes from two schools as control group. The tools used in this study were constructivist instructional package, conventional lecture package, and fifty-five multiple-choice integrated science tests, pre-test, post-test and delayed post-test. During treatment the experimental groups were exposed to Constructivist Learning environment (CLE) and control groups for conventional lecture learning environment (CLLE). Students’ achievement was also recorded before, after and delayed post-level level. SPSS 13 version was used compute paired sample ‘t’ test and independent sample ‘t’ test in this study. Findings revealed that, there was significant increase in the mean scores for both post-test and delayed post-test in constructivist learning group than the traditional lecture group in topic one as well as topic-2. There was significant difference in the pre-test, post-test and delayed post-test mean scores of students in experimental group and conventional group with respect to topic-1 as well as topic-2

Gundogdu (2010) carried a research on “effect of employing constructivist methods and materials on attitudes of prospective teacher towards human rights in education”. The study planned to explore the effectiveness student psychological
counselors’ attitude towards human rights education treated with constructivist instruction and treated with traditional instruction. The study was Quasi-experimental non-equivalent pre-test and post-test control group design in nature. The study conducted during 2008-2009 academic year and the sample constituted of two groups of students studying in Department of guidance and counseling in the public university of turkey. The day class students were treated as control group; which includes 23 female and 17 male students. The evening class students considered for experimental group; which includes 22 female and 23 male students. Totally 83 student psychological counselors’ took part in the study. During intervention, traditional group taught through instructor centered lecture method; whereas experimental group was exposed to constructivist activity based learner centered activity. For testing attitude towards human rights, Human Rights Education Attitude Scale developed by Kepenekci was used. The data was analyzed by using mean, standard deviation and two way ANOVA. The findings of the study were; there was increase in the post-test mean score of control and experimental group after intervention. But attitude mean scores were decreased in both the groups in follow-up application. The study exhibited that experimental group was more effective in developing the attitude towards human right compare to control group.

Calik, Ayas and Coll (2010) adopted Quasi-experimental pre-test, post-test and delayed post-test to investigate “effectiveness of teaching methods based on a four-step constructivist strategy”. The study used purposive sample. The sample selected form the elementary school situated in Trabzon, Turkey; sample includes 44 students from two 9th grade classes. The sample includes 26 girls and 18 boys. The study used four-step constructivist approach/Generative Learning Model 1. Eliciting students pre-existing ideas 2. Focusing on the target concept 3. Challenging student’s ideas and 4. Applying newly constructed ideas to similar situation. The study adopted triangulation method, in which multiple methods were used to collect the data. They were 1) a purpose-designed solution chemistry concept test consisting of 17 items, 2) student interviews and 3) student self-assessment tasks. The findings of the study were; four step constructivist models helped the students to store their conceptions in their long-term memory. Also reduced students’ alternative conceptions. Pre-test and post-test scores were statistically significant. But post-test and delayed post-test scores were not statistically significant. Using different methods embedded within the
four-step constructivist based teaching strategy enables students to refute some alternative conceptions, but does not completely eliminate student alternative conceptions for solution chemistry.

Nagalakshmi (2011) conducted an investigation on “Effectiveness of constructivist approach on student’s achievement in science, science related attitude, science process skills and perception of nature of science at secondary level”. The purpose of research study was to development of science lesson based constructivist model and to find out effectiveness of constructivist approach on academic achievement, students perception of nature of science, developing in processing skill, developing science related attitude, students’ opinion towards science and to know the correlation between achievement and other variables of the study. The study was a quasi-experimental in nature in which non-equivalent control group design employed. The study was conducted on 7th standard students studying in two schools located in Salem. Two intact classes were treated for experimentation. The first class was selected from Glaze Brooke Matriculation School and treated as experimental group which comprises 36 students (21 boys and 15 Girls). The second class was from Vidhya Bharathi Matriculation School and considered as control group; which consist of 32 students (16 boys and 16 girls). The study was conducted in three phase. In I phase researcher had developed constructivist Model based on 4 E’s Model and other tools namely Achievement Test in Science, Perception of Nature of Science Test, Science Process Skills Test, Science Related Attitude Scale, Opinion towards Science Scale, and Reaction Scale Semi-Structured Interview. In second stage researcher had tried out the constructivist teaching module to know the effectiveness of the module. At last tested modules were implemented in intact class as for the research design. The t test, Pearson’s product movement correlation and analysis of covariance test were calculated by using SPSS 10 version. The study showed that 1) There was significant difference between post-test mean scores of academic achievement, perception of nature of science, process kill, mean scores of science related attitude, opinion towards science of constructivist group and traditional group. 2) Constructivist method scored higher than he control group. 3) Gender has not influenced on the academic achievement, mean scores of perception of nature of science, mean scores of process skill, science related attitude, opinion towards
science. 4) Study recorded significant correlation between all the variables of the study.

Padmananabhan and Rao (2011) conducted quasi experimental pre-test post-test design to explore “Effectiveness of constructivist approach on the student’s problem solving ability in Science”. The main objective of this study was to assess the effectiveness of constructivist approach on the problem-solving ability in science subject. The study used purposive cluster sampling. The study was carried out in Class VII of Manasarovar Pushkarni Vidyasharama Mysore. Two VII class sections were selected wherein one section as assigned as control group and another group as experimental group. Thus intact classes were considered as experimental and control group. There were 40 students in each class with 16 girls and 24 boys in experimental group, and 21 girls’ and 19 boys in control group respectively. The study was conducted in three phase. Phase I- development and tryout of the tools. The researcher had prepared lesson plan based on 4 E’s cycles and tried out the model. Phase II implementation phase. It includes administration of pre-test, problem solving ability test and treatment. And Phase III includes administration of tools. The study used both descriptive (frequency, mean, percentage) and inferential statistics (ANOVA). Study found that, 1) the students of constructivist performed higher in problem-solving ability test than the students in the control group. 2) Experimental group has differentially gained more scores for problem solving ability and constructivist approach has improved the ability of problem solving of the experimental group. 3) There was no significant difference among low, average and high achievers of those students taught by constructivist approach and those taught by conventional method in problem solving ability test. And recorded there was no significant difference in (F=0.603; p<0.550). 4) The interaction between group and level was also found to be (F=2.89; p<0.062) not significant. 5) Constructivist approach found equally effective for both boys and girls in improving their problem solving ability in science. 6) Regarding the reaction towards constructivist approach, out of 42 students, 40 students (95.24) liked new approach.

Nayak (2011) conducted an experimental study on “The effect of problem-based learning strategy in constructivist framework on different dimensions of mathematics achievement of class-IX students”. The study used non-equivalent pre-
test post-test quasi experimental design to compare the achievement of students in mathematics subject in experimental and control group. The sample consisted of 155 students of IX class studying in two schools of Bhubaneswar city in Orissa. From each school two IX class were selected and one class was treated as an experimental group and another section as a control group. The first school comprised of 65 students in which 33 students in experimental group and 32 in control group. The second school includes of 90 students, in which 45 students each in experimental and control group. Here experimental group was subjected to 5 E’s Learning cycle based constructivist problem strategy and control group with traditional teaching. For collection of required data, mathematics Achievement Test developed by investigator was used, which consisted of 30 items and validated by the expert to measure the achievement of the students. The t tests, ANCOVA were used in the study for data analysis. The study reveals that there was a significant difference in the academic achievement of student in experimental and control group. ANCOVA analysis reveals that treatment influenced on the students to gain higher academic achievement in experimental group than the control group. There was no significance difference between experimental and control group in respect of knowledge and skill in Math’s where experimental group demonstrated higher achievement of understanding and application than the control group.

Ramanath and Sivakumar (2011) conducted a study on “Constructivism based learning strategy in enhancing the science process skills of the students of secondary schooling”. The study was undertaken to expound effectiveness of constructivism based learning approach in enhancing science process skills of secondary students. The study also find out the correlation between these two variables, influence on gender in enhancing processing skills and significance difference between boys and girls and students who scored below 50 and students scored above 50 in science processing skill. A single group experimental design in nature adopted to study the effectiveness of intervention. The study was conducted on 50 students studying in IX standard in schools around Karikudi. Sample was drawn 10 students each randomly from five schools. The study adopted 5 E Model approach developed by RUGGERIO to teach the class. A questionnaire of “test for science process” and 25 marks academics achievement test was administered to collect the data. The collected data were subjected to statistical analysis using mean, standard deviation, ‘t’ test and
Pearson product movement correlation. The study found that constructivism based learning strategy enhances the science process skill among the secondary school learners. Gender has no influence in enhancing science process skills through constructivism base learning approach. The constructivism based learning approach has an influence in enhancing science process skill among low achievers too. And science processing skill and achievement in science of the students have significant relationship between each other.

Tandel (2012) undertook a study on “Development of metacognitive skills in science student-teachers through constructivist approach”. The objective of this study was to study the development of metacognitive knowledge and regulation in science students’ teachers which learning science through constructivist (5 ‘E’ models approach). The population for the study was made up of science methodology teacher trainings studying in B.Ed. programmer affiliated to Hemachandraghary North Gujarat University, Patna of 2009-10 year. The study considered purposive sample to select the sample. The study was carried out in B.K.K.P.S.M College of Education and only 10 B.Ed student teachers and having Science methodology. The investigator developed observation record, interview method, student’s reflective essay; metacognitive skills inventory to collect the data. In course of implementation of experiment, student teachers were divided into group-1 and group-2 and each group includes 5 students. 5 E learning, programme introduced to both the groups and recorded in the form of audio-recorded. After each learning session a single student was interview through audio recording and all ten student-teachers were writing their reflective essays and related to observation through audio recording, interview through audio-recording and reflective essays were obtained. MSI was implemented twice on the student teachers before and after the programme. Considering nature of the study, investigator used quantitative and qualitative. Quantitative data was analyzed using non-parametric technique such as Wilcoxon Sign Rank Test (Pretest & Posttest), Z-value (Developing metacognitive skills). However qualitative data treated using the arranging, coding framework, Schraw model of metacognition, and Flavell et al. model of metacognition. The study revealed that there was a significant difference between the pre-test and post-test scores of declarative knowledge, procedural knowledge, conditional knowledge, metacognitive knowledge, planning
skills, monitoring skills, evaluation skills, Metacognition regulations and metacognitive skills in science student teachers.

Jayalekshmi (2012) conducted a study titled “effectiveness of critical pedagogy combined with constructivist approach in learning commerce at the higher secondary level”. The study was design to compare the effect of critical pedagogy combined with constructivist approach with that of activity based approach in enhancing the achievement of XII standard learners of commerce. The study was an experimental in nature and used pre-test post-test non-equivalent group design. Higher secondary schools of Kerala comprised the population of the study. The sample comprised of XII standard students studying in New Higher Secondary school, Nellimoodu and Government Medical college higher secondary school Thiruvananthapuram. 140 students from Thiruvananthapuram participated in the study. Among 48 students were from New Higher Secondary School and within students were break-up into control group (24) and experimental group (24). Similarly 92 students from Government Medial college higher secondary school took part in the study; out of students were spread into control group (46) and experimental group (46). The study used three tools for intervention, transcript lessons, achievement test, social and emotional skill inventory and all were developed by the researcher. The researcher has developed lesson transcripts based on critical pedagogy combined with constructivist approach. The study conducted in pre-test, treatment and post-testing phase. In I phase researcher collected data pertaining to academic achievement, retention and social and emotional skills. In treatment phase researcher used critical pedagogy combined with constructivist approach lesson transcripts to taught experimental groups. In case of control group researcher used activity based approach transcripts following lecture method with a little effort of group. During this phase formative assessment tools administered assess the higher order thinking skills, social and emotional skills. In post-test phase, post-test of achievement and social and emotional were given to both the groups. The study revealed that experimental group performed better in the post-test achievement than the control group. There was significance difference in co-variance of pre-test and post-test achievement scores of learners in the experimental and control group. Critical pedagogy combined with constructivist approach was more effective than activity based approach in enhancing the achievement (based on achievement test -1), retention level (based on total
achievement), the retention level (based on achievement test - II) learners of commerce at the higher secondary level. Critical Pedagogy Combined with Constructivist Approach was more effective than Activity based Approach in enhancing the social and emotional skills, the social skills of learners of commerce at the higher secondary level. Critical Pedagogy Combined with Constructivist Approach was more effective than Activity based Approach in enhancing the social and emotional skills of boys.

Bay, Bagcici and Cetin (2012) experimented “the effects of Social Constructivist approach on the learners problem solving and metacognitive levels” by adopting semi-experimental design with pre-test post-test control group. The participants of this research were teacher candidate of faculty of education in Turkey. The teacher candidates who selected “the principle and Methods of Instruction” subject were considered and sample constituted of 89 subjects in experimental group and 48 candidates in control groups. Experimental group was taught using authentic task-based social constructivist approach and traditional method and meaningful learning environment was used in control group. For this study, researcher used the two tools; first, adopted the problem solving tool developed by Heppner and Peterson to elicit the problem solving skills. Second, Metacognition scale was developed to collect data about Metacognition levels. The study used SPSS 16 version to analyze two-factor ANOVA. The study revealed: There was a significant difference in the teacher candidates of control group and experimental group with respect to problem solving skills and metacognitive levels. The difference favors the experimental group and performed better in both the areas. Authentic task based social constructivist approach was more effective in increasing problem solving and cognitive awareness level of the students. The ANOVA results revealed that there was no significant difference between the results of pretest and posttest of experimental and control group before and after the application.

Nayar and Senapaty (2011) undertook a study on “the effect of constructivist approach on students’ creative ability”. The sample consists of 125 class-V students from two different English medium schools in Bhubaneswar city. The selections of these two schools were through purposive sampling method. The experiment was set up according to the non-equivalent pre-test post-test quasi experimental design. The
study developed the constructivist approach based on 5 E instructional model and CAT (Creativity Ability Test) as a measuring tool assess the Creativity Ability at pre and post-test level. In excrement process experimental group was taught through constructivist approach and control group with traditional method by the researcher. The Hypotheses was tested at 0.05 level using t-test and ANCOVA. Analysis was carried out using both descriptive and inferential statistics. The findings of study were 1. Creativity scores of constructivist approach group was higher than the control group. There was significant effect of constructivist approach on creativity. 2) Constructivist approach was more effective than traditional approach in enhancing the various dimensions of creativity viz., fluency, flexibility and originality. 3. Constructivist Approach had a significantly higher creative ability in both fluency and flexibility dimension of CAT but no such different found on originality dimension. 6. Overall Constructivist Approach (CA) is an effective strategy than Traditional Method of Teaching (TMT) for developing fluency, flexibility competency, but not the originality competency.

Muhanty and Zubair (2012) carried out a study on “a comparative study on constructivist model and behaviorist mode of teaching in achievement of Mathematics”. The objective of the study was to find out the effectiveness of constructivist model of teaching and behaviorist model of teaching. To compare the effectiveness of both models of teaching. The control and experimental groups method was employed in this study. The sample consisted of 52 IX standard students of G.H.S.S Mavoor. The 52 students were divided into two groups, control group and experimental group contains 30 students each. Among these 16 were boys and remaining 10 girls. In experimental group investigator used constructivist model of teaching and control group behaviorist model. The investigator conducted an achievement test consisting 13 questions to know the effectiveness of the treatment. For the analysis of the data arithmetic men, standard deviation and t-test were used. The findings of the study are 1. Constructivist model of teaching was more effective than behaviorist model of teaching. 2. There was no significant difference between boys and girls in experimental group by constructive model of teaching and it was interpreted that sex has no effect on the achievement of the students. 3. There was significant difference between achievement score of boys in constructivist model and behaviorist model of teaching 4. There was significant difference between
achievement scores of girls in constructivist teaching and behaviorist model of teaching. There was significant difference between achievement scores in constructivist model of teaching and behaviorist model of teaching.

Rajendran (2012) adopted qualitative case study to investigate “A study on constructivist approach to environmental education among primary pre-service student teachers”. The study was an attempt to determine the student teachers changing perspectives about environmental concepts in the constructivist classroom. For this study, Tirupattur Teacher Training Institute, Tirupattur, Vellore district in Tamil Nadu was selected. The study was conducted in four elementary school and three middle school selected for the purpose of internship programme for the Teacher Training institution. For this study 49 first year and 50 students were selected purposively. Among only 11 student teachers of first year and 6 student teachers of secondary year were selected based on the willingness form the selected schools. For research purpose researcher identified 19 environmental themes based on three aspects specifically content analysis of text books, concept maps and focus group discussion. Focus group discussion, participant observation, semi and unstructured interviews and document analysis were the main data collection technique used in the study. The data was collected in two phases. In I Phase data was collected with student teacher. And II Phase when student teacher teaching at school. The data analysis carried out during field work and post field work. The data analysis was done in two manner; Student teachers and learners’ participation in Constructivist classroom on environmental themes/concepts; Student teachers and learners’ perceptions about Constructivist Approach to Environmental Education. The findings of the study were; better understanding on environmental concepts was developed among students in constructivist environment; student changed their ideas in the light of evidences; student teacher belief on constructivist approach and found that organization of learning resources was important for successful constructivist classroom.

Nair (2012) applied survey design to study “the Constructivism as An effective pedagogy: perception of Teachers”. Sample of the study consisted of 35 upper primary school teacher from Alappuza district. She used group discussion and interview technique for collection of data. The study revealed that most of the
teachers’ pinioned that Constructivist approach is very effective in transacting knowledge at primary school level.

Raval (2012) conducted a study on “Effectiveness of constructivist approach to the teaching of animal classification in science and technology of standard ninth”. The study implemented Non-randomized two group post-test design. The technique used for selection of students for experiment was purposive sampling and sample restricted IX standard secondary school students studying Rajkot city. The participants of the experiment were selected from two schools viz., central school and Rajkumar college school. The study conducted on 140 students; among 80 students were from central school (further students divided into experimental-40 and control group -40) and 60 students from Rajkumar School (further students divided into experimental-30 and control group -30). For experimentation and data collection researcher developed and used the four tools. First, Constructivist Instructional Program (Based on 4 E Learning Cycle) as model develops for the topic animal classification; Second Achievement test based on same topic; third, an opinion for the learner learned through CIP; fourth, interview schedule. Modules were taught by the two persons; as investigator researcher taught the experimental group through and another group i.e., control group was taught traditional Herbert teaching programme by classroom teacher. Data was gathered regarding effectiveness intervention using achievement test, opinion scale and interview schedule. The gathered subjected to quantitative (Descriptive and inferential- t-test, Man-whitney U Test) and qualitative statistical analysis. Findings of the study were; there was no significant difference in posttest mean of students taught through traditional teaching approach and CIP. There was a significant difference between post-test score and retention test scores of learners of traditional group and experimental group. Post-test scores of boys and girls of CIP group was higher than the boys and girls of control group. This indicates that CIP was more effective in increasing the post-test scores of boys and girls of experimental group than the control group.

Bogar, Kalender and Sarikaya (2012) undertook a study on “The effects of constructive learning method on students’ academic achievement, retention of knowledge, gender and attitudes towards science course in matter of structure and characteristics unit”. The study used quasi-experimental research design with pre-test and post-test control group. The research conducted in two school of Ankara in
Turkey. The participants were 68 students of 7th grade class. Classes were randomly assigned to experimental group and control group. The experimental group consists of 34 students and control group 34 students. Control and experimental groups were exposed to traditional teaching method and constructive method. The treatment tool used in experimental group was constructivist method and for control group traditional method based on narrative question and answer and discussion etc. Researcher had taken four week to complete the treatment. For data collection researcher had used data collection tools namely, post-test, scale of attitudes towards science (used before and after treatment), and retention test (three months after the treatment). Besides five studies interviewed with the help of semi-structured interview to collect information about reasons for their answer. The data analysis was done by applying t-test. The study showed that there was a significant difference between the experiment group and control group with respect to mean scores of academic achievement as well as attitude towards science. There was a significant increase in boys and girls mean scores of achievement and mean scores of attitude towards science of experimental group than the control group after treatment. And constructivist teaching was more effective instruction method than the traditional method.

Jayalekshmi and Pereira (2013) conducted a study on “Assessment practices in constructivist paradigm at the higher secondary level in Kerala”. The study used survey method. Participants of the study were from higher secondary schools. Sample comprised of teachers of commerce (50), students of commerce (500) and principles (10) of higher secondary schools. Questionnaire, interview (for principals) and focus group discussion (students, teachers, parents and) used to collect the data. The study found that 1) Principles of assessment developed was very appropriate and suitable for the requirements of higher secondary students in Kerala context. 2) Assessment methods and recording procedures were appropriate for higher secondary school level as for critical pedagogy and constructivist approach. 3) The study established relationship in learning outcomes, assessment tasks and assessment criteria.

Srinivas (2013) conducted quasi experimental design to assess “the effectiveness of constructivist approach on the achievement in science of IX standard students”. A non-randomized pre-test and post-test was used. The study used
purposive cluster sampling to collect the data. The experiment was conducted on IX standard students of Gowtham Model School, Suryapet, Andhra Pradesh. Two sections were selected, one was treated as experimental group and another as a control group. Each group constituted of 22 students. Other specifications of sample were 1. No of sections selected: Two 2) Medium of Instruction: English 3) Gender: Boys and Girls 4) Nature of Class selected: intact class. Researcher implemented the research in three phases. In first stage lesson plan and instructional materials were developed for the unit ‘Life Process’ based on 5 E’s constructivists instructional model. Also achievement test was developed. In second stage; researcher used the constructivist model intervention for experimental group. Whereas control group was taught using conventional method by the regular classroom teacher. The total hour spent for treatment was 6 period covering days. In last phase, post-test was administered to both classes. The study analyzed the collected data using descriptive (Frequency, Percentage, and Mean) and inferential statistical analysis (t-test). The study found that 1. The constructivist approach has a positive effect on the achievement of students in science than the control group. 2. There was no significant difference between boys and girls achievement in science as an effect of constructivist approach. Approach was equally suitable for both boys and girls.

Agarwal and Adepu (2013) conducted a comparative study on “effectiveness of Activity Based Learning with traditional teaching method”. Randomized pre-test and post-test design was adopted for the study. The sample drawn from 4th class students studying in Chandrapur district. 60 students belong to 4th standard CBSC were selected; among 38 boys and 22 girls were included in the study. Again students were equally (30 each) assigned to control group and experimental group. The study developed activity based learning models in English, Mathematics, science and Social Science and Art and Craft study. Activity adopted here were play, draw, write, search, think etc. The researcher taught experimental group with ABL and control group with traditional approach. In ABL class students were assembled in 5 groups namely A,B,C,D and E. In each group students leader will pick the card accordingly engage the group member in activity. Later, card will exchanged among the groups and activities were organized in group according to the instruction to complete the ABL tasks. The study used pre-test and post-test to collect data about achievement of students. The study used mean, SD, ‘t’ test to analyze the data. The study found that;
ABL group and control group was statistically significant with respect to post-test scores. Group work in ABL class motivated, stimulated the students and increased their involvement and achievement in class. ABL approach created joyful learning among the 4th class students compare to traditional approach.

Malik, Khurshid, Rehana and Nazim (2013) conducted experimental design to explore “Effects of constructive instruction on student’s academic achievement at elementary level”. The main objective of the study was to determine the effect of traditional and constructivist methods on academic achievement of 8th standards students of Social Science subject. The study adopted pre-test post-test control group design to compare the academic achievement. The students were equally distributed to control and experimental group. Each group consists of 15 students. For controlling teacher variable two teachers were selected based on the experience (5-15 Year of experience) and professional qualification (B.A., B.Ed.) and randomly assigned to control and experimental group for teaching. For the purpose of the study, training was organized to selected teachers about principles of constructivist method and constructivist lesson plan by researcher. Accordingly for period of month constructivist teacher taught lesson to experimental group. Likely control group by conventional teacher with the help of textbook reading method. The study used TMAT (Teacher Made achievement Test) before and after treatment for both the class to assess the academic achievement in social science subject. The results of the study showed that students who were taught through constructive teaching showed better results on TMAT than students of control group who were taught through traditional instruction method. The achievement level of students of experimental group was better than control group.

Gautam (2013) conducted a study on “Effect of developed instructional material on attitude of pupils’ teacher towards constructivist approach”. The study investigated attitude of pupil teacher towards constructivist approach treated through orientation of constructivist approach with developed instructional material group and orientation of constructivist approach group. The study used purposive sampling techniques and sample derived from Agra city. The sample comprised of 40 students and equally distributed (20 students each) to control and experimental group. The study used two materials for conducting the researcher. First, constructivist approach
material developed by researcher. For this researcher considered specifically; content analysis XI Biology text; selection suitable constructivist approach; and preparation of lesson plan. Second, researcher had developed the scale to measure attitude of teacher trainees towards constructivist approach. During experimentation the experimental group and control groups were treated with orientation of constructivist approach with developed instructional material and orientation of constructivist approach group respectively. After the orientation, attitude scale was administered to collect attitude about constructivist approach. Descriptive and t-test was used analysis the data. The findings of the study were, there was significant difference (t=4.03, P<.01) between attitude of experimental and controlled group of pupil teacher on attitude constructivist approach. Mean difference indicate that attitude of pupil teacher of experimental group of orientation programme found better than that of attitude of controlled group.

Puhan, Sharma and Malla (2013) conducted a study titled “Effect of constructivist approach on developing composition skills in English at upper primary stage”. The objective of this study were ; adopting constructivist approach to develop composition skill midst VII class learners and study the effect of constructivist approach on the learners in developing composition skills. The study was conducted based on pre-test and post-test signal group design. The researcher used the purposive sampling technique to select 64 students of VII class. Achievement test on composition for class-VII, Test A-Guided compassion and free composition test-B were used to collect the date form the students. The data were analyzed with mean, SD and t-test analysis. The study found that 1) post-test mean scores of composition was higher than the pre-test mean scores and statistically significant. 2) Collaborative and cooperative learning techniques help the learner in achieving the skill of language through sharing of ideas. 3) Constructivism helps in linking previous knowledge and new knowledge and institution in constructing knowledge.

Krishnaiah (2013) carried a study on “Constructivism and its approach of teaching social science at secondary level – A critical survey in Telangana region”. Stratified Random Sampling technique represents the sample of the study. The sample selected for the study consisted of 100 secondary school teachers and 300 secondary school students of CBSE schools located in Telangana region of Andhra Pradesh.
They were representing form Warangal, Ranga Reddy, Karimanagar, Nalgonda, Khammam and Medak districts of Andhra Pradesh. Among teachers sample was appropriately representation from experience, gender and locality. The researcher developed constructivist teaching questionnaire, opinion towards constructivism in Social Science and observation schedule for social science teachers to observe their classroom interaction. The investigator personally approached all forty-three CBSE school and gathered the information. The researcher used mean, SD, t-ratio, f-ratio and percentage for analysis of data. The findings of the study were; constructivist approach helps to create a congenial and democratic environment in the classroom; constructivist approach seating arrangement was accepted by the students and setting arrangement enables to reflected true child-centralism in teaching-learning process. Constructivist approach was useful for social science teacher to demonstrate multi-cultural diversity in their presentation. Junior teachers were more effective in engaging constructivist classroom than the senior social science teachers. Similar urban area teachers were emerging in using constructivism teaching and classroom management compare to rural area teachers. The teachers who exposed to constructivist orientation programme was more effective in manage constructivist class than what were not attended. Very few teachers providing resources and guidance to the student to construct the social science concepts on their own.

Shetty (2013) conducted study on “A comparison of the effectiveness of the constructivist and traditional approach in the teaching of English as perceived by student teachers”. The investigator has employed the survey method. In the study, the students of Bachelor of Education programme of Mumbai University were selected as sample. Sample comprised of 45 English methodology B.Ed teacher trainees. The study was conducted as part of teaching in practice. In first step student trainees were oriented about 5 E’s learning approach followed by in second step students were coach and guided to implement in English grammar and composition lesson. In third step, students implanted during practice in teaching. At last students’ opinion was collected in the form of feedback by using tool traditional and constructivist approach. The findings were: The Constructivist Approach was significantly higher in the area of developing Thinking Skills, Social Skills and learning skills among learners than the Traditional Approach as perceived by student teachers. The Constructivist Approach was significantly higher in the area of overall general effectiveness than the
traditional approach as perceived by student teachers. The student teachers perceive the Constructivist Approach significantly more Effective in Grammar Instruction, in composition instruction and overall English Instruction than the Traditional Approach.

Ilyas, Rawat, Bhatti and Malik (2013) conducted a study on “effect of teaching algebra through social constructivist approach on 7th graders learning outcomes in Sindh (Pakistan)”. The main objective of the study was to find out the difference exists in effectiveness of traditional approach and Vygotsky’s social constructivist approach. Quasi-experimental design was adopted in this study. The population of the study was all public sector seventh graders of Jamshora district. The sample of the study consisted of two existing intact 7th A and B section class of government boys’ high school. And 7th A section was designated as control group and 7th B section as an experimental group. According to the design traditional class was treated by Maths teacher solved the problems on blackboard using one-way lecture. However experimental group i.e. 7 B section treated by Vygotsky’s three phase social constructivism approach. The investigator collected the Qualitative data using the pre-test (to find out the difference in previous knowledge) and post-test (to find out the difference in achievement). ‘t’ test was calculated to find out difference in experimental and control group by using online ‘t’ test calculator from GraphPad Quick Calcs website. The findings were: there is no statistical significant difference in pre-test mean score of experimental group and control group. Whereas there was a statistical significant difference in post-test mean scores of control and experimental group. Mean difference indicated that experimental group (M=9.04) taught through Vygotsky social Constructivism approach achieved better in the post-test compare to control group (M=5.31) taught through problem solving through one way lecture.

Kumari (2014) conducted 2 X 2 factorial design with co-variate to study “constructivist approach to teacher education: An integrative model for reflective teaching”. The study was conducted on VI standard students. The study was conducted find out the effects of different method of teaching science on the achievement, basic science process and skills and scientific attitude of standard six pupils with different achievement levels. The study intended to know the interaction patterns associated with the teacher demonstration, guided discovery and cooperative method teaching and variation in interaction patterns due to change in pre-achievement levels of pupils and to study the relationship between teaching process
and learning outcome related to the dependent variables of the study. The study revealed that cooperative learning method of teaching science was significantly more effective than the teacher demonstration method and guided discovery method in improve the basic scientific attitude and retention of achievement on the application objective among higher achievement due to the process variables. Cooperative learning method of teaching science is significantly more effective than the teacher demonstration method and guided discovery method on the learning outcomes of the application objectives among high achievers and on the retention of high achievers with respect to application objectives.

Rathod (2014) conducted study on “Development of training programme for B.Ed. students to use constructivist techniques (Graphic Organizers) in teaching of History and to test its effectiveness”. The study conducted to develop and study the effectiveness of Graphic organizers as constructivist technique practice in B.Ed. programme. Single group pre-test post-test experimental design was used in this study. The study adopted purposive sampling. Amongst the three grantable B.Ed. colleges in Pune city Tilak College of education was chosen. The college constitute of 160 B.Ed. teacher trainees belong to different method. The researcher selected and carried out experiment only on the 30 B.Ed. trainees having history method. The constructivist training was conducted by bearing in mind 6 types of graphic organizers. Pre-test and post-test were used to collect data. Mean, SD and ‘t’ test were used to analysis the data. The study reported that the training programme created awareness about constructivist graphic organizers among the history method trainees. Graphic organizers are helpful in history method. And graphic organizers proved that they were the best tool for representing the content

Vijayan (2014) undertook a study on “teaching learning mathematics in the constructivist classroom-A field experience”. The study supported with empirical evidences which were collected through multitude of sources during a three-month field visit at Central School for Tibetans, Bylakkupe, Karnataka. The study follows descriptive survey method. The study combined both quantitative and qualitative research techniques for collecting and interpreting data. Triangulation methodology was incorporated for drawing appropriate conclusions. Study habit scale, personal involvement scale, mathematics base test, scale of attitude towards mathematics and
achievement in mathematics, open discussion and some opinion was collected from the opinion sheet. The quantitative data was analyzed through suitable statistical technique namely product moment correlation, multiple regression analysis and t-test. Qualitative data was also used for cross-checking the information. Findings reveal that the entire variable namely, achievement in mathematics, attitude towards mathematics, mathematics base, and study habits a parental involvement correlated with maths. All the predictor variables have positive influence on the dependent variable, i.e., achievements in mathematics. There was statistically (N) significance difference in performance in formative assessment -1(M=23.6) and formative assessment -2 (M=2.5) when students were engaged in cooperative group work in mathematics.

Kablan and Kaya (2014) carried out a study on “pre-service teachers’ constructivist teaching scores based on their learning styles”. The researcher has selected a comparative/correlational method to study the relationships between pre-service teachers preferred learning styles and their constructivist teaching scores. The data was also collected without manipulating the information. The study was conducted on a sample of 198 students studying in second year faculty of education at a large university in northwestern Turkey. Among, 94 students were in primary education and 104 from primary Mathematic education programme. The total sample consist of 164 (82.8%) male students and (34 17.2%) female students. The tools used in the study for data collection were: (1) the constructivist teaching evaluation form (2) and The Kolb’s Learning Style Inventory (LSI)-Version 3 (Kolb 1999). The data was gathered in 2012-2014 micro teaching sessions. The researcher had used SPSS 18 version to calculated ANOVA, Bivariate correlation analysis. The study revealed that; majority of students i.e. 46.6% reported highest sores in assimilating learning style whereas least scores i.e. 9.10% in delivering learning style. 29.9% and 15.16% were reported with respect to learning styles converging and accommodating respectively. ANOVA reveled that there was a significant difference in the evaluation scores of students with respect to different learning styles. Students’ constructivist evaluation scores were positively correlated with active experimentation and negatively correlated with students reflective observation cores.
Khan (2014) conducted a descriptive study on “Constructivism: An innovative teaching method in science teaching”. He has conducted his research studies on the basis of secondary sources of data collected from books, research article published in standard and prestigious journals. He concluded that many countries like USA, Italy, Turkey, Nigeria efforts have been made to adopt constructivist philosophy in the teaching of science, researchers were conducted in primary and secondary school and constructivist theory relates more to growing children and not much to the higher learning stage.

Akanwa and Ovute (2014) undertook a study on “effect of constructivist teaching model on SSS Physics students’ achievement and interest”. The main objective of the study was to find out difference in the achievement scores in SSS Physics subject taught through constructivist teaching approach and conventional approach. The study was based on a Queasi-experimental design and conducted in intact class environment. The study was conducted senior secondary public school in the Obollow-afor Education Zone of Enugu state. In the zone four secondary schools that constitute of physics students in the SS2 class were selected as sample of the study. Total sample size of the study was 160 students. However the experimental and control group consisted of 80 students respectively. During the treatment Waves and sound content were taught for two weeks using constructivist model in experimental groups. Also the same content was taught using convention chalk and talk method for a few periods in control group. Finally interest scale and achievement scale constructed and developed was administered to the four classes. ‘Z’ test and descriptive statistics were used to analysis the obtained data. The study indicated that 1) the constructivst teaching model was more effective than counterpart conventional teaching model in improving achievement in SSS Physics. 2) There was significant difference between the mean achievement scores of constructivist teaching model group and conventional teaching model group. And significant difference favors the constructivist teaching model group. 3) The constructivist teaching was more effective in creating interest in physics subject than counterpart conventional teaching model.

Kusmaryono and Suyitno (2015) conducted a study titled “Mathematical power’s description of students in grade 4th based on the theory of constructivism”.
Qualitative ethnographic research was considered in this study. Data was collected by adopting qualitative technique namely in-depth interviews; observation and recording of learning process; collection, study and analysis of students records and textbooks; achievement test. Data was collected related to mathematical problem, problem solving ability and knowledge construction process. The study reported that; students have understood how to learn and they were delighted to learn math’s with pictures. Students were able to construct knowledge related to mathematical ideas by their own. Students were successfully building their mathematical strength little by little through process of assimilation and accommodation. Students were able to accommodate mathematical knowledge with assistance of teacher. Constructions of mathematical power of students have influenced the thinking of students in problem solving.

Kulsum (2015) conducted study on “Perception of secondary teacher about constructivism”. The descriptive field study was adopted and data was collected from 200 teachers from rural and urban secondary school of Bengaluru in 2007-2008 academic years. The mean age of the participants is 28.5 years of which 63.3% of the sample is female and 36.7% is male teachers drawn from secondary schools of Bengaluru city. Teacher’s perceptions about constructivism developed for the present investigation was used in the study. The scale was developed incorporating constructivist learning in literature. It was four point scales to measure four dimensions of constructivist approach and total number of items were 48. Dimensions were students; teaching organization; teaching; and setting the stage. The study found that on the perception of constructivism, the teachers from rural secondary school and urban school reported highest mean perception. In opposite lowest mean perception was reported in the mean score of urban secondary teachers followed by rural unmarried teachers. With concern to total mean perception urban teacher reported higher perception compare to their rural counterparts. Concern to mean perception in different subject’s highest mean was reported in teaching of science (163.67) followed teaching language (M=139.82) and teaching mathematics (132.82). With respect to mean perception of dimensions of constructivism study found that highest mean value was reported in dimension setting the stage (M=116.59), lowest was reported in dimension students (M=109.07). Dimension teaching (M=115.80) and teaching organization (M=114.70) reported second highest and third highest mean values.
Semerci and Batdi (2015) conducted meta-analysis entitled "Meta-analysis of constructivist learning approach on learners' academic achievement, retention and attitudes". The main objective of this meta-analysis was to answer the question Does a constructivist learning approach have any effect on learners academic scores? In order to obtain the data the study analyzed research studies conducted in national and international from 2002-2015 related to effects of constructivist learning. 324 studies (218 articles and 106 theses) were analyzed from various sources namely, Taylor & Francis Online, Science Direct, Pro-quest Dissertations and Theses, National Thesis Center of the council of Higher education, Ebscohost-ric and Google scholar. The study examined 28(10 articles and 18 thesis) of 324 studies based on pre-test post-test and comparison process. These studies collected data related to pre-test and post-test and comparison of both the tests. The studies were selected based on the following criteria 1) pre-test post-test control group based studies undertook in constructivism. 2) The studies which were examined the effectiveness of constructivist approach on learners academic process 3) studies stated sample size 4) studies covered in national or international area 5) studies researched in 2002-2015. The analysis used two encoding method: first, study identity and study content and second, statistical information necessary to conduct meta-analysis. The analysis used treatment effectiveness meta-analysis method to analysis the data. The study used the classifications by Thalheimer and Cook (2002) for statistical analysis. The effect size of Constructivist Learning on academic achievement (ES: 1.0753), retention (ES: 0.9249) and attitude (ES: 0.4394) were calculated. The study found that: 1) large level effect size was exhibited in academic achievement and retention variable and medium size effect on attitude. 2) Constructivist approach was positively effect on the learners’ academic achievement success, retention and attitude scores. 3) Connected to this, the study also recommended further searcher for practitioners and researchers.

Ramulu (2015) study on “Enhancement of student learning in Biology using constructivism”. The investigator adopted control and experimental group method to study the effect of constructivist teaching and traditional teaching related to science lab activity to study the interest in science subject. For this study, students were grouped into two lab section and each group includes 18 students. Control group and experimental group were engaged Monday and Wednesday respectively in lab activity from 3.45 to 5.30 P.M. During the lab session experimental group exposed to
constructivist class and control group traditional class experience. In both class students instructed to record their observations, discuss same with team members about relationships and concepts and present before the lab. Researcher administered weekly quiz before lab session. Alongside to quiz, the study used science inventory to collect students’ interest in science subject. The study used to test to compare the biweekly quiz scores. The study found that: there was a significant difference between the quiz scores of constructivist group and control group and constructivist group performed better compare to traditional group in quiz scores. Constructivist group performed higher in attitude inventory over their counterpart control group. Similarly, constructivist group show higher efforts attending the lab compare to control group.

CONCLUSION

The review of related literature related to constructivism reveals that constructivism is one of the important pedagogical practices in core and language subjects in education. While studying the constructivism, previous studies considered constructivist practices differently like constructivist approach; social constructivism; 4 E’s instructional model as constructivist approach; 5 E instructional model as constructivist approach and four step constructivist approach; guided discovery as constructivist; 5 E’s Model approach based on RUGGERIO and Graphic organizer as constructivist teachnique. Maximum number of studies considered 5 E’s Model or 4 E’s Model as effective constructivist approach.

These researchers conducted their studies in primary, secondary, senior secondary, teacher education and degree level. They also covered science, mathematics, Physics, Chemistry environmental education, English and Social science subjects. They considered different variables in their study. Among them academic achievement is the variable. Other variables were science process skill, perception of nature of science; problem-solving ability; problem based strategy; constructivism and metacognitive knowledge in science; critical pedagogy, learners problem solving and behaviorist approach. Studies based on single group design shown that students achievement is higher in post-test compare to pre-test. Two group design studies showed that constructivist practices were more effective than the control group in enhancing the academic achievement of the student’s. The studies also demonstrated that constructivism helps in improving the processing skill,
problem solving skill and meta-cognition knowledge skill. It was also evidenced that very few studies were conducted in Social Science subject. Thus, the present study attempt to study effect of constructivist teaching in IX standard social science subject. The study considered 5 E’s instructional model as one of the component of developing constructivist teaching.

2.3. STUDIES RELATED TO JIGSAW STRATEGY

Ghaith and Bouzeineddine (2003) conducted a study on “Relationship between reading attitudes, achievement, and learners perceptions of their Jigsaw II cooperative learning experiences”. The sample of the study comprised of 111 students studying in eighth grade of English as Foreign Language. Students were elected from the four sections in two branches of middle school in Lebanon. The study was conducted for twelve weeks with involvement of two experience teacher with 5.6 years of regular experience in teaching. Before intervention, the selected teacher undergone four days in-service workshop on dynamics of Jigsaw II cooperative learning. Later they the treatment proceeds following the criteria suggested by Slavin: Step 1. Assignment of students to teams; Step 2. Reading the experts topics; Step 3. Students with same expert groups met and discuss the theme; Step 4. Team reporting; Step 5. Participating in individual quizzes; Step 6, Team recognition. The study used two questionnaires and a semantic differential scale to assess the reading attitudes and perception of their Jigsaw II cooperative learning. Besides, specifically designed pre-test and post-test used to assess the achiemvnet of the students. Descriptive statistics, correlation coefficient, two multivariate analysis of covariance were used to analysis data as for pre-decided questions. The findings of the study were: there is positive relation between reading attitudes and reading achievement, but not to the perception of Jigsaw II cooperative experience. There is significant difference in the high and low achievers and male and female in reading attitudes, achievement and perception of Jigsaw II cooperative experience.

Hanze and Berger (2007) carried out a study titled “Cooperative learning, motivational effects, and student characteristics: An experimental study comparing cooperative learning and direct instruction in 12th grade physics classes”. The study adopted quasi experimental design to compare the achievement of students in jigsaw group and control group. The study was conducted in 2002-2003 academic year.
There were 137 students studying in 12 grade took part investigation. The study used cross over design which helps in investigating the interaction of both between as well as subject factor. The experiment was conducted in few steps: In the beginning two hours students engaged in direct instruction about general introduction of content motion of electrons and electromagnetic oscillations and waves. In following two hours i.e. in double period experimental group and control group were involved in jigsaw activity and traditional instructional class approach. In jigsaw group learning content is divided into four parts, which are self-constrained comprehensively segments. Jigsaw group consist of 3-5 students. They assigned with same material and accordingly they engaged in preparation of presentation as well as involved in the experiments. In next process they were allowed to form the experts groups based on their assignments. During the jigsaw activity students were administered with learning experience questionnaire after completion of expert group activity and completion of jigsaw group. Where as in related to traditional classroom students engaged in same material as used by the Jigsaw group but they were engaged in direct instruction by the teacher. The learning experience questionnaire was given only after completion of the lesson. Finally, posttest was administered to collect the effect of the treatment. The study used personality questionnaire and pre-test and post-test to collect the data. Data was analyzed with MANOVA and path analysis method. The study found that: there is no difference in the achievement gain in both the group but there was difference observed experience namely autonomy, competence and social relatedness, in self-reported cognitive actions and in degree of intrinsic motivation. Path analysis showed that the basic needs partially mediated the effect of method of instruction on cognitive activation and intrinsic motivation.

Souvigier and Kronenberger (2007) conducted a study on “Cooperative learning in third graders’ jigsaw groups for mathematics and science with and without questioning training”. The purpose of the study was to explore comparative effect of three instructional conditions such as jigsaw, jigsaw with supplementary questioning training and teacher-guided instruction. The study comprised of third grade class students studying in three schools of Frankfurt, Germany. From each school three classes were selected and randomly assigned to intervention of three different instructional conditions. A total of 208 students took part in the experiment. The teachers were selected who willing to teach cooperative method based on cooperative
teach guide. The study selected three units from mathematics and one unit from the science subject and each unit consists of six lessons. The study used home and expert group activity to engage the students in Jigsaw cooperative learning. During intervention, three classes engaged in standard jigsaw cooperative learning, remaining two classes each engaged in Jigsaw with additional question training and teacher guided instruction. The teaching sections of home and expert group activities also videotaped. Each recording time was 10 minutes, totally 56 groups activities were recorded and analyzed. Achievement of the students in different units assessed using the researcher designed 20 multiple choice pre-test, post-test and delayed post-test. The study found that: there was no difference in achievement of three conduction in math’s unit. Where as in case of Astronomy units, students benefited more from the teacher-guided instruction. Differential analysis reported that experts learnt more than the students of teacher-guided instruct, novices were outperformed by the students in control class. The study exhibited satisfactory results related to jigsaw cooperative learning and found that the children learnt the jigsaw method and how to work independently in group tasks most of the time.

Kilic (2008) carried out a study on “the effect of the Jigsaw technique on learning the concepts of the principles and methods of teaching”. The main objective of the research was to study the effect of the jigsaw technique used in collaborative learning and that of classical learning method on the academic performance of the student. The subjects of the study collected from Kazim Karabekir Education faculty, Ataturk University. A total of 80 students who were studying in second year and opted teaching principles and method course of two separate sections constituted of the sample. Out of, one section was treated as experimental group and applied with jigsaw technique and second section as control group applied with classical learning method. The study used PGBT (Program Development Success Tests) tool, which consisted of 30 multiple choice question each with 5 choices test covered from the program development topic. The researcher also established the reliability and validity of the test. The study used the t-test to analysis the data. The findings of the study were: there is no significant difference in the between the average scores of the groups. Jigsaw group performed higher in post-test point average score compare to the traditional group.
Shain (2010) conducted a study on “Effects of jigsaw II technique on academic achievement and attitudes to written expression course”. The main objective of the study was to examine the effects of cooperative technique Jigsaw II and instructional teacher–centered teaching method on Turkish language teacher education department student’s attitudes to written expression course, their academic achievement, retention and their views. The study follows pre-test post-test with control and experimental design. Eighty undergraduate students of two class of Turkish language teacher education department at Ataturk University constitute sample of the study. Classes were randomly assigned for experimental/Jigsaw group (n=42) and control/non-Jigsaw group (n=38). Study used Attitudes to Written Expression Scale (ATWES) and Written Expression Achievement Test (WEAT) and Students View Form (SVF) to collect the effect of intervention. The experiment was conducted for six week. I week, forms home groups and group members discuss and decide how they need to study the topic. II week, prepare the teaching materials and get ready for the expression course. III week, forms expert group based on same code study the material. IV week, experts group attend test and based on subject and their level of expertise. Accordingly, only the students who have 90% above achievement level allowed to return to their home group. V week, expert group members written to their group and taught the topic to members of the same group. In the VI week, randomly students were selected for oral presentation of written expression of written expression scores. Where as in control group written expression course topic were taught using teacher-centered teaching method. The study used to test to analyze the data. The study revealed that, Jigsaw II was more effective compare to instructional teacher centered teaching in development of writing skills of the students. Jigsaw group also more effective in developing positive attitude towards the course compare to instructional centered teacher centered teaching.

Xiaoling and Qiao (2010) conducted an experiment based survey on “Jigsaw strategy as a cooperative learning technique: Focusing on the language learners”. The main objective of this study was to survey the opinion of students about their involvement in jigsaw intervention. It was a mixture of experiment and survey. The sample size was 95 students of two college English class. These students were divided into 8 tutorial class of 11-12 each and research carried out in these tutorial classes for
10 weeks. The jigsaw technique was employed by following seven steps and they help in integration L + four R’s + W. First step, choosing passage. Second step, dividing the students into jigsaw groups (1 Min). Third step, studying the new words (2 mins). Fourth step, involving the whole class in an activity for general comprehension (4 mins). Fifth step, forming the expert groups (8 mins). Sixth step, students return to jigsaw group (30 mins). And last step, writing the summary. Lastly, questionnaire was administered to check whether cooperative learning principles were manifested in the intervention. Questionnaire was developed based on the five basic principles of cooperative learning. The study found that 1) students have positive attitude towards face to face interaction. 2) 76% of students felt better and learnt better in cooperative learning groups. 3) 9% of students never enjoyed discussion in jigsaw. 4) 82% of students performed in the group activity according to the proficiency and personality. 5) 72% of students were interested to present their work to class or teacher. 72% students admitted that they learnt while teaching someone in cooperative learning. 6) 70% of students were confident in speaking in English with their friends. 7) 73% of students reported cooperative learning develops new relation with each other. 8) 67% of students admitted that discussion was necessary to achieve the goals. 9) 71% of students confirm the importance of motivating the students’ communication and accomplishing the task in jigsaw activity.

Koc, Karacop, and Simsek (2010) carried out a study on “The effects of two cooperative learning strategies on the teaching and learning of the topics of Chemical Kinetics”. The main purpose of this study was to compare effect of group investigation, jigsaw technique and traditional teaching on students’ achievement in chemical kinetic. The study was conducted on 106 undergraduate students studying in three different undergraduate class in the year 2008-2009. Classes were randomly assigned to three groups. First class (n=30) was treated as investigation group and received the group investigation approach. Second class (n=40) selected as investigation group second and received with Jigsaw technique and third class (n=36) treated as a control group and assigned with traditional classroom teaching. After completion of intervention Chemical Kinetics Achievement Test (CKAT) and Graphics Skills Test (GST) were administered to collect the data. The study was conducted over a four week period, before intervention groups were administered with Graphics Skill Test. Later investigation group one was taught engaging the
students in three phases of group investigation method: in-class discussion, out-of-class investigations and in-class presentation. The second group was engaged in Home and jigsaw activity based Jigsaw method and third group was engaged with traditional teaching. The collected data was subjected to one way ANCOVA and post-hoc test to find out the difference in the three groups. The study found three major findings: 1) Jigsaw group students were more effective than the other two groups in GST and SKST scale. 2) When GST scores were co-variated, the results of the covariance analysis of CKAT scores showed that impact of the teaching techniques on academic achievement was significant. 3) Jigsaw technique was more effective in increasing the academic achievement compare to Group investigation and teaching.

Gocer (2010) conducted quantitative and qualitative nature study on “A comparative research on the effectivity of cooperative learning method and jigsaw technique on teaching literary genres”. The study was conducted to compare the level of effectiveness of jigsaw cooperative technique and convention teaching method applied in teaching literary genres. The researcher adopted experimental design with control group supplemented with interview method to collect the qualitative data. The sample was taken 60 students studying in 11th grade of Kayseri state High school for the 2008-2009 educational year. The sample drawn from Branch A (n=30) and Branch B (n=30). These classes were randomly assigned (Branch B) to experimental group and control group (Branch A). The study was started in the form of administration pre-test (General question list) to assess the prior knowledge level. Subsequently, experimental group taught via forming home group and jigsaw group cooperative learning technique and control group applied with conventional teaching. Finally general questions list was re-administered as posttest. Students were also interview to collect data refer to application process of the approach. The quantitative data of general questions list scores was analyzed using SPSS version11 and interview data analyzed following qualitative approach based content analysis. The study found that: Jigsaw technique was more effective in reducing the ongoing examination stress; mentoring learning; and developing cooperative working and communication skills. There was statistical proximity between pre-test and post-test scores. There was statistically significant between pre and post test scores.

Pandya (2011) conducted a study on “Interactive effect of co-operative learning model and learning goals of students on academic achievement of students in
mathematics”. The research answered the research question Is there any interactive effect of co-operative learning model and learning of goals of students on academic achievement of secondary school students?. The study adopted pre-test–post-test non-equivalent group design which follows quasi-experimental design with factorial design was used in the study. The study was conducted in IX standard students of two schools situated in Greater Mumbai took part in the study. A total of 173 students covering both boys and girls constituted sample of the study. The researcher developed instructional plan for cooperative learning model based on Jigsaw Technique and Think-Pair-Share to teach experimental group and conventional method based on lecture for control group. The study used researcher made achievement test and learning goal inventory developed by Pandya (2004) to collect the effective of the intervention. Pre-test and post-test were used to assess the initial level of the student knowledge and verify the effect of the intervention respectively. Both the test were validated based on content and face validity of achievement test. Collected data was analyzed using t test, ANCOVA, and Two Analysis of Variance. The study found that there was significant difference in the post-test scores on academic achievement of students of experimental group and control group. Analysis of ANCOVA for partial out the effect of pre-test scores findings revels that there was a significant greater in the academic achievement experimental group than that of the control group. The two way ANOVA analysis revealed that cooperative learning model is found to be more effective for students with mastery goal whereas the traditional method is found to be more effective for students with performance goals.

Baskaran (2011) study entitled “Effectiveness of cooperative learning approach (Jigsaw-II with reward) in enhancing the academic achievement of learners in learning social science at the secondary level”. Based on the non-randomized control group pre-test–post-test design the study compares the effectiveness of Jigsaw-II with reward approach and traditional approach. The study was conducted in VIII standard social science subject. The sample comprised of 40 students studying in Alagappa Model Higher secondary school, Karakudi. These students were equally divided into experimental and control group of each 20 students. The 20 students were grouping into 4 teams with 5 members in experimental group for the engangage the students in Jigsaw-II learning activity. During experimentation experimental group exposed in jigsaw and control group for traditional approach. The study employed
pre-test and post-test to measure the academic achievement of the students before and after intervention. Gather data was analyzed using the t test. The study found that, the jigsaw cooperative learning is more effective than the traditional method in improving the academic achievement of the students.

Tran and Lewis, (2012) adopted pre-test-post-test Non-equivalent comparison group design to investigate the “the Effect of Jigsaw learning on students attitudes in Vietnamese higher education class”. The main objective the study was to find out the cause and effect relationship between jigsaw learning pedagogy and achievement in MAE course. The sample consisted 80 final year students from two mathematics class in the faculty of education at An Giang University in Vietnam. Based on the variables of age, gender and GPA score 80 students were matched into two groups of 40. Each group consisted of 24 male and 16 female students. During the intervention, the students control group learnt based on lecture-based teaching following logical steps treating entire class as group. Here teacher was a transmitter of information and interaction results between teacher and students. While in experimental group students learnt through jigsaw technique and teacher acts like instructor and engage students in eight steps. First, identifying the objectives of the subject matter. Second, organizing the learning material. Third, formation of home groups (10) and jigsaw groups (5). Fourth, the instructor explained the process. The students of group members receive the sub-units and read the content to the group members. Hence, group members acquaint with the sequence of the learning material. Fifth, Students move to jigsaw groups. Here ten home groups were converted into eight jigsaw groups. Sixth, jigsaw group students get mastery over the respective subunit with the help of group members. Seventh, jigsaw group members return to home group and teach to their group members. They help one another to get complete knowledge of subject matter. Finally, the instructor assessed understanding of the entire unit through students’ presentations in front of the whole class. At the end attitude questionnaire was administered to know attitude of the students towards jigsaw cooperative learning. The study found that 1. There was positive impact of cooperative learning on attitudes of the groups in their own learning. 2. There was strong correlation between higher achievement and positive attitudes in cooperative learning. 3. Treatment group reported that cooperative learning experience were more effective than the traditional
learning in terms of effective learning; helps discussion and exchange of information; more learning in group etc.

Bukunola and Idowu (2012) carried out a study on “Effectiveness of cooperative learning strategies on Nigerian junior secondary student’s academic achievement in basic science”. The study carried out by applying 3 X 2 quasi experimental pretest-posttest-delayed posttest control group design. It was three group design, first two groups were experimental groups and third group was control group. The population of the study was junior secondary III students studying in local government areas of Ogun state, South/west Nigeria. The study conducted in the intact classes selecting school dependent on 1) availability of basic science teacher 2) willingness of the teacher for intervention and the teacher’s cooperation in involving in the intervention process. Cooperative learning guide, Achievement test for basic science and basic science anxiety tools were used to collect the data. The study implemented in the four phases. In first phase, pre-test was administered for one week. Second phase, intervention of three group design for six week. Fourth phase - post-test was administered to all the groups (one week) and last phase was delayed post-test phase last two week of the ten weeks. The main intention of delayed post-test to know whether students retain the basic science concepts taught. The data analyzed through descriptive statistics, analysis of covariance and multiple classification analysis. SPSS 15 version was used to analysis the data. The study revealed that 1) The ANCOVA result revealed that there was significant main effect of interventions and anxiety level on the post-test scores. Moreover these two variables together interacted and reported significant interaction effect on post-test scores. 2) Whereas multiple classification analysis reported that there was significant higher level effect of Jigsaw II on post-test score. 3) Similarly there was significant main effect of intervention and anxiety level on the delayed post and both were significantly interacted on the same scores. 4) There was significant difference in the delayed post-test academic achievement scores obtained from three different treatment conditions.

Raja and Janani (2013) carried out a study on “Effectiveness of jigsaw learning on the upper primary wards performance in mathematics”. The study was conducted to find out the difference in the post-test and pre-test scores of control and experimental group taught using Jigsaw learning method and traditional method with
regard to learning objectives namely Knowledge, understanding, Application and Skills. The study was conducted in VII standard students studying in St. Joseph Girls Higher Secondary School, Tirunelveli, Tamilnadu. The treatment for experimental group was conducted based Aronson model. Accordingly, experimental group students were divided into A, B and C group with A1, B1 and C1 as group leader. Each group consists of 6 students. Group activity was carried as for home and expert group activity. The study used Non-verbal Intelligence Test developed by Atmanand Shara and Achievement Test in Mathematics. The data analyzed using independent t-statistical test. The study revealed that there was no significant difference in the pre-test and post-test scores of knowledge, understanding, application and skills of control group where as significant difference was observed in the experimental group. Significant difference in the gain scores of the control and experimental groups with regard to the learning objectives namely knowledge and skill, but not with regard to understanding and application. But there was no significant difference in the scores of delayed post-test with respect to control and experimental group with regard to the learning objectives namely knowledge and application but not with regard to skill.

Marhamah and Mulyadi (2013) conducted a study on “Jigsaw cooperative learning: A viable teaching-learning strategy?” The study used quasi-experimental method to investigate the effect of jigsaw cooperative learning instruction on the second year undergraduates’ achievement of teaching learning strategy. The study was conducted on 52 second year undergraduate students in Islamic education department. Out of 28 students considered for experimental group and remaining 24 were participants of control group. Before the commence of one day of the treatment pre-test was administered to the both the groups. Further, in six week nine topics were taught in experimental group and control group applying jigsaw cooperative learning strategy and group discussion strategy. At the end, post-test was given to both group. The t-test was calculated to analyze and interpret the data. The study found that there was a significant difference in the academic achievement of students in jigsaw group and group discussion group. Jigsaw group performed better than the group discussion group.

Chu (2014) investigated effectiveness of “Application of the Jigsaw cooperative learning method in economics course”. The main objective the research
was to investigate the impact of Jigsaw cooperative learning method on students learning performance in Economics. Research conducted in Chung Yoan Christian University and 127 students from business school took part in the study. For treatment students randomly assigned to two groups; group-1 was experimental group and group-2 traditional group. Experimental group was also called as Jigsaw group which consisted of 76 students and control group was referred as a Non-Jigsaw group and there were 51 students in the control group. Intervention was carried out teaching Jigsaw cooperative learning method in experimental group in which students engaged in a few sequential activity; students themselves with four members into learning team forms as basic team; providing problem by the instructor and divided into four content/subject area; According to subject area students from different group forms expert groups and read, discuss and organize their content for presentation; later return to their group present their mastered subject area to their group members in the form of teach and elaboration of ideas; taking achievement of the group in the form quiz. In parallel class the control group was taught using the conventional method. The study used pre-test to measure and control the prior knowledge and quantitative chapter quizze was administered to collect the academic performance of students. The study found that 1. The average points of the experimental group where Jigsaw technique used in cooperative learning is greater than that of the control group with respect to post-test 1, post-test 2 and post-test. Average points mean scores favors the Jigsaw group in all the post-test. Thus study concluded that there was significant difference in the achievement scores of Jigsaw group and Non-Jigsaw group and Jigsaw group performed better in all the post-tests and showed Jigsaw technique found to be more effective than traditional method.

Miaz (2015) conducted study on “Improving students achievement of social science by using jigsaw cooperative learning model at primary school”. The main objective of the study was to determine the achievement of students in social science subject. The study was conducted in fifth grade class of state primary school of Bukittinggi, West Sumatera. The study is classroom action research is nature. The study fixed 70 as minimum criteria score for determining the intervention for action research. The study adopted Jigsaw cooperative learning model for classroom action research. The study was conducted in four stages namely planning, implementation, observation and reflection. The study implemented in three cycles and each cycle
consists of all the steps of action research. Observation, documentation, testing and field notes were used to collect the data during the jigsaw based action research. Study used qualitative and quantitative method to analyze the data. The study showed that, there was increase on the teachers teaching skills and students achievement. The average scores of teacher teaching skill increased for first cycle (2.6), second cycle (2.8) and in the third cycle (3.6). Similarly student scores were increased steadily from 67.9% (first cycle), to 75% (cycle II) and the final 92.5% (cycle III). The study proved that as an action intervention Jigsaw cooperative learning increased the academic achievement of the students.

Garcha and Kumar (2015) undertook a study on “Effectiveness of cooperative learning on critical thinking dispositions of secondary school students”. The study was non-equivalent in nature, wherein a control group pre-test and post-test design employed. The sample consists of 116 students of 9th class of government high school Khasi Kalan, Ludhiana, affiliated state board. The student of the researcher has used simple random sampling technique. Two intact 9th Class were selected and class were randomly assigned to experimental and control group. Thus study employed the random sampling technique. The experimental group was treated social science subject with Jigsaw cooperative learning module developed by the researcher. The total duration of intervention fourteen periods and each period for 60 minutes. The control group was taught with the help of lecture/discussion method for same number of periods. The researcher has controlled extraneous variables i.e. influence and motivation of the teacher by teaching researcher himself. After intervention, Critical Thinking Disposition Scale (developed by Mincemoyer, Perkins, and Munyua and revalidated on Indian population by Malahan, A) was administered to the both the groups. The study found that, there was a significant better critical thinking dispositions reported by students taught by using Jigsaw cooperative learning method compare to traditional method of teaching. There was no significant difference in the critical thinking dispositions of boys and girls. Critical thinking dispositions of students were found independent of interaction between gender and cores of critical thinking dispositions. Critical thinking dispositions of students were found independent of interaction between gender and group (teaching method).
Ananthi, Sudha and Nathan (2015) conducted pre-test post-test equivalent group design to study the “Effectiveness of Jigsaw technique in enhancing the reading comprehension skills of secondary level students in English”. The main objective was to compare reading comprehensive skills of VIII standard students in experimental and control group. The sample was taken 60 students studying in VIII standard through purposive sampling. Out of, 30 students were assigned to experimental group with treatment of reading through Jigsaw teaching technique and remaining 30 students were assigned to control group with treatment of reading through conventional method. The researcher constructed tool to comprehension skill of student. It consist of two part; part A include 11 items related to general information of the candidate and part B includes 15 items and assess the reading compression question as achievement test. Graphical representation and t-test was used to analysis the data. The findings of the study were; there was significant difference in reading comprehension of the students of experimental and conventional group with respect to pre-test as well as in post-test. There was significant difference in reading mean comprehension score of girls and boys, urban and rural.

**CONCLUSION**

From the review of literature related to jigsaw cooperative learning, it can be observed that Jigsaw is the most popular cooperative strategy. The previous studies also considered Jigsaw I and Jigsaw II. However, all the studies reported that Jigsaw is pear tutoring and learner engaging approach to encourage learner centered education in all the levels of education. Jigsaw I and Jigsaw II concern studies were considered achievement, reading comprehension, motivational effect, critical thinking and they were conducted in primary, secondary, senior secondary and teacher education level. While considering the subject, they carried out their research in the language, science and mathematics and, very few studies were noticed regarding teaching socials science subject. Thus there is a research gap in studying the impact of jigsaw on social science subject. In the light of this the present study considered social constructivist approach Jigsaw I as component of constructivist approach for teaching social science.
2.4. STUDIES RELATED TO TECHNOLOGY

Dange and Wahab (2006) conducted study on “Effectiveness of computer assisted instruction on the academic achievement of IX students of Physical Science”. The purpose of the study was to know and compare the effectiveness of computer assisted instruction and over conventional method on academic achievement in Physical science. A parallel or equated group experimental study was employed in the study. IX standard students of Sri Aurobindo High School at Shimoga were selected as sample. 32 students took part in the experiment and they were divided into two equated groups: experimental group and control group and each group consisted of 16 students each. The CAI has been developed in Microsoft PowerPoint considering different tasks and learning frame involved in process of learning content. At the end of each task questions will be there to test student learning. In view of that researcher used CAI in experimental group to teach the “The Universe”. Another group i.e. control group was taught same content by conventional method. 30 multiple choice item based Achievement test on the topic “The Universe” was constructed by the researchers was used to assess the academic achievement. The ‘t’ test was used to analysis the data. The study revealed that there was no significant difference between mean gain scores of experimental and control group of pre-test. There was no statistical significant difference in mean gain scores of pre-test and post-test of control group. There was a statistical significant difference in mean gain scores of pre-test and post-test of experimental group. There was statistical significant difference in post-test mean scores of experimental and control group.

Jyothi (2007) studied “Impact of computer-based learning on students of Chemistry”. The study had two fold purposes: first, prepare a self-instructional model on the topic chemical bound for 9th class chemistry. Second, to compare the effectiveness of self-instructional module with conventional teaching method. The study used static group comparison design to compare the effectiveness. The sample comprises of 40 students, studying 9th class of Little Star High School, Madannapet. PowerPoint slide on “Chemical Bond” story board for all slid was created to develop self-instructional module. Hyperlink was used to link all the 50 slides. For measuring effectiveness rubric evaluation tool designed by Intel(MOU with Microsoft) for multimedia presentation has been used. The tool was also validated with the help of
12 experts in computer education and chemistry subject. The study selected two tools for investigation. Pretest prepared form lesson “Properties of Gases” to confirm the quality of the control and experimental groups. Post-experiment test in “Chemical Bond” to test the influence of computer-based learning in chemistry. In experimental procedure, researcher divided the 40 students into two equal group (each 20 students) based on the achievement scores of pre-test. Later experimental group was taught with the help of computer-based learning model and control group by conventional chalk and talk method. After treatment both the groups were exposed to post-test. The study used independent ‘t’ test to analysis the collect data. The study revealed that the experimental group performance was far superior to the control group. This was substantiated with the t-value which was found to be statistically significant at .01 level of significance.

Devanathan (2008) conducted a study on “Opinion of school teachers at secondary level with regard to the level of integration of technology”. The study planned to know the opinion of school teachers regarding levels of integration of technology in terms of percentage of teacher in the selected area of school curriculum. The study used stratified random sampling to select the teachers working in secondary school located in Pudukkottai district of Tamali Nadu. Researcher used openionaire to elicit integration of technology in selected area of school curriculum and questionnaire to elicit background information of teachers. Data was analyzed using frequency, percentage and chi square analysis. The study shown that 49% of teachers expressed that examination should be conducted irrespective of mastery without individualized instruction whereas 19% of the teachers said that mastery should be considered first ignoring the fixed time. For effectiveness of learning 24% of teachers felt that only traditional material should be used whereas 28% of the teachers said that only high-teach materials should be used. Regarding student effective learning 36% of the teachers expressed that the teacher was an expert and there was no need to integrated technology whereas 28% of the teachers said that technology along should be trusted to guide the students for effective learning. Chi square analysis revealed there was no significant difference in male and female, science and social science teacher and UG and PG teachers’ opinion about level of integration of technology

Nimavathi and Gnanadevan (2008) conducted pre-test and post-test equivalent group design to study “Effectiveness of Multimedia programme in Teaching science”
The study was attempted to prepare multimedia package and compare the effectiveness of computer multimedia programme over traditional method of teaching secondary science. The sample of the study was selected from the IX standard state board students studying at Thiruvannamalai district, Tamil Nadu. The sample of the study comprised of 105 students; sample includes both boys and girls. To realize the objective researcher has developed Multimedia programme for biological science content based Macromedia flash version 6.0. The programme was broken down into 75 small learning modules. In the beginning pretest administered to the groups. After that experimental group was taught with the help of multimedia module and control group with traditional approach. After the treatment post-test was administered to collect the data know the effectiveness of the modules. The study found that there was no significant difference between the experimental and control group in pre-test mean scores of achievement. Later, there was significant difference was found between these two groups at post-test level. There was no significant difference in pre-test and post-test mean scores of achievement in control group. Whereas, significant difference was observed in pretest and posttest mean scores of achievement in experimental group. This has indicated that multimedia programme help the students to score more marks in achievement test than the conventional method.

Rafeedali (2009) conducted a study on a sample of 300 higher secondary teachers to explore “computer-based technology and its pedagogical utility”. The main objective of this study was to identify the basic computer knowledge, purpose of using and extent of using computer resources in teaching and learning process among the higher secondary school teacher. The study considered stratified random sampling technique to draw higher secondary teachers from the Malapuram district of Kerala. Researcher used the self-developed computer awareness questionnaire to collect the data. Due to the incomplete questionnaire researcher retained only 150 questionnaires and excluding were rejected for analysis. The study used percentage analysis to analyze the data. The findings of the study were 1) among the secondary school teacher 64% were using computers for educational purposes and 48.67% and 25.33% were using them for entertainment and evaluation purposes respectively. 2) Female higher secondary school teachers (66%) were dominant in using computer for educational purpose than male higher secondary school teachers (64%). 3) Only 25.33% of the higher secondary school teachers were using computers for the purpose
evaluation but 48.67% of higher secondary school teachers were using computers for entertainment. 4) Only 13% of higher secondary school teacher were using PowerPoint presentation in the classroom. LCD was used only by 11.3% higher secondary school teachers, but the sticking point was that 39.33% of higher secondary school teachers were assigning computer based assignments to the students.

Ambasana (2009) conducted a study on “utilization of computer technology in remedial instruction”. The purpose of the investigation was to study the effectiveness of Computer-assisted Instruction program in remedial instruction of Unit-Light: Reflection and Refraction of science and technology subject of Grade X. The study implemented pre-test post-test single group design. The study followed purposive sampling technique. The study selected one of the X class out of three sections of Shri Sarvodaya Vidalaya a secondary school of Rajokot city. The study developed diagnosis test, post-test and remediation module. Before treatment researcher administered diagnosis test and diagnose the difficulties in the lesson. Subsequently Computer Assisted Instructional plan was developed in PPT slides using dynamic content (animated graphics), hypermedia, stimulus variation, animation and dynamic content. Accordingly CAI based remedial class were organized for 30 to 40 minutes for four days. At the end same pre-test was assigned to the group. The study calculated t-test to compare the pre-remedial test result and post-remedial test result. The study found that there was significant difference in pre-test and post-test mean scores of section-1, section-2 and section-3.

Anboucarassy (2010) undertook a study on “Effectiveness of multimedia in teaching Biological Science to IX standard students”. The study adopted experimental method with parallel group design to examine effectiveness of multimedia approach over the conventional method in teaching Biology subject. The study used random sampling procedure to select 80 students of class IX from Jeevanadum Government Higher Secondary school in Pondicherry. The research developed Multimedia page and used that package to taught experimental group for one month. Correspondingly the same lessons were taught using traditional method to control group. The researcher developed and administered achievement test namely pre-test and post-test to both the groups to collect data connect to effectiveness of treatment. The study adopted t-test analysis to find out the difference in the mean scores at pre-test and post-test level. The study concluded that experimental and control groups were
statistically significant at post-test level; multimedia helped the experimental group to perform better in post-test and also helped in sustain their interest and retention compare to control group.

Ponraj and Sivakumar (2010) carried out a study on “Computer-Assisted Instruction in Zoology in relation to learners’ personality”. The study adopted pre-test post-test control group design to compare the effect of CAI treatment and traditional treatment. The population of the study consisted of 300 students studying in standard XI. Out of those, only 180 students were selected based those who have scored 60% and above marks in half year exam. The investigator had developed computer software package for Zoology topic of standard XI. An experiment involves; initially sample was equated into experimental group and control group. Based on CAI package used in experimental group and traditional approach in control group. The study used pre-test and post-test and Myers-Briggs Types Indicator personality test were used to collect the data. The study employed t-test and F-test to analyze the data. The study revealed that 1. There was no significant difference in pre-test achievement of control and experimental group 2. Whereas significant difference was found in post-test achievement of control and experiment group and experiment group performed better in post-test compare to control group. 3. There was significant different in the achievement of control and experimental group with regard to learning objective knowledge, understanding, application and skill level.

Selvam and Anbazhagan (2013) adopted normative survey to study entitled “study of technology based teaching of Geography among high school teacher in Karur Taluk”. The normative survey method was used in this study. 100 Geography teachers of government and private school in Karur Taluk was taken as the sample. A check list containing 12 items and four point rating scale was used as the tool for assessing the technology based teaching. The investigator in person went to those schools and distributed the check list and instructed to fill the checklist in the presence of the investigator. The study revealed that there was a significant gender difference among high school teacher in the nature of utilization of technology for teaching geography. Medium of instruction has no significant influence among high school teacher in the nature of utilization of technology for teaching geography. There was no significant difference among government and private high school teachers with reference to nature of utilization of technology. There was no significant difference
among urban and rural high school teachers with nature of utilization of technology for teaching geography.

Agrahari (2013) conducted a study on “Technology Based Learning Environment and achievement of students in chemistry at secondary level of CBSE and UP board in India”. The study implemnted Pre-test post-test equivalent group design to compare the Technology Based Learning Environment (ICT) and traditional method. The population of the study constituted of 2011-2012 batch 9th standard students studying in CBSE and UP Board of Gorakhpur region of Eastern UP having ICT facilities. The study selected four schools based on lottery method and 9th standard of those schools were the participants of the study. And groups were randomly assigned into experimental group and controlled group. The sample constitute of 80 and 140 students form UP and CBSE Board respectively. Researcher prepared lesson plans for traditional classroom and experimental classroom; accordingly lessons were taught to both groups during intervention. The study used achievement test (pre-test before intervention and post-test after intervention) Intelligence test and socio-economic status scale to collect the effectiveness of the treatment. The data was analyzed using statistical techniques mean, S.D and t-test. The study found that there was a significant difference in academic achievement in the group of experimental group and control group in post-test and mean difference favours experimental group. Significant difference was also found in experimental group and control group in CBSC board and UP Board school.

Menezes and Castelino (2015) conducted study entitled “the effect of multimedia approach on developing self-directed learning and achievement among secondary school pupils”. The study is an attempted to determine the effectiveness of the instructional material based on Multimedia approach in relation to the existing physics method of teaching in developing self-directed learning among secondary school pupils after adjusting the initial difference in creativity and self-esteem. The study was Non-randomized control group pre-test post-test design in nature. The researcher prepared and tested the effectiveness of an instructional material based on the multimedia approach to develop self-learning and achievement. The population of the study was all secondary school pupil of Dakshina Kannada District of Karnataka state. The study followed the purposive sampling method, which consisted of 80 students studying in IX standard. These students were divided among experimental
and control group based on scores of Raven’s Progressive Matrices Intelligence Test. Researcher used self-constructed tool to measure the self-directed learning. Besides Achievement test, and also the covariate self-esteem while verbal test of creative thinking by Baqer Mehdi was used to measure the second covariate i.e. Creativity. The experimental procedure comprise of three levels i.e. pre-treatment level, treatment and post-treatment level. In first level creativity, self-esteem, self-directed learning and achievement test as administered. In second level research design was systematically implemented by which experimental group was given treatment of thirty hours using self-directed learning material. The control group was taught using existing method. In last stage data were collected to know the effectiveness of the treatment. The collected data was analyzed through descriptive (mean and SD) and inferential statistical analysis (t test, coefficient of correlation, and ANCOVA). The study concluded that multimedia approach was effective in developing self-directed learning skills and achievement. Instructions with the use of text, pictures and audio intensify the potency of learning and as a result one can expect positive end results.

CONCLUSION

Similar to constructivism and Jigsaw, technology was also a very popular field of research. From the review of related literature it was clear that studies considered technology components namely CAI, Multimedia, technology based learning and technology based teaching proved that they are more effective in enhancing the academic achievement of students. Studies by Dange and Wahab (2006), Ambasana (2009) and Ponraj and Sivakumar (2010) considered CAI. Gnanadevan (2008), Anboucarassy (2010), Menezes and Castelino (2015) were related to research on multimedia teaching. Selvam and Anbazhagan (2013) conducted their research on Technology Based Teaching. Similar to this study, Agrahari (2013) investigated on Technology Based Learning. Jyothi, (2007) had conducted research on Computer Based Learning. Devanathan (2008) researched on Technology Integration. But all the studies were conducted in science subject with reference to specific subject of science area. The studies were conducted at different levels of education. These studies also reported that due to technology, experimental groups were performed higher level of achievement as well as in other variables like critical thinking, remedial instruction, knowledge, understanding, application and skill. More importantly it was observed that studies were not used technology component as tools for constructivist practice.
Therefore, there is a gap to investigate the effectiveness of Technology component in initiating constructivist practice. Thus, the present study considered technology as one of the components of initiating constructivist practice in enhancing academic achievement of students of IX standard in Social Science subject.

2.5. STUDIES RELATED TO TECHNOLOGY INTEGRATION IN CONSTRUCTIVISM

Pear and Crone-Todd (2002) conducted a study on “A social constructivist approach to computer-mediated instruction”. The main objective of the study was to develop CAPSI (Computer Assisted Personalized System of Instruction) course material based on social Constructivism to teacher undergraduate psychology class. It includes short answer study question for learning 10 study units. The study was conducted on 24 undergraduate psychology students at the University of Manitoba. The students were selected based on the area who enrolled to “Principles of Behavior Modification”. After successful completion of teaching CAPSI course, feedback received from the students. The collected data was analyzed minimal or substantive way. The study showed that; the CAPSI was flexible one it can be modified and adopted with any another method and approach. It created social interaction in electronics settings. CAPSI has created student control course material and engaged in knowledge construction. CAPSI was highly useful in systematic way of implementing the course materials.

Costa, Chaudhari and Nunes (2011) carried out a study on “the attitude that B.Ed. trainee teachers have towards constructivist online learning”. The specific objective of the study was to determine the attitude of B.Ed. trainee teachers towards constructivist online teaching. The sample consists of 51 B.Ed. students studying at Pushpanjali College of education. The programme, which spanned from August 2010 to February 2011, used different techniques namely webinar, regular online test, web quests, situation based learning designs, online discussion boards to facilitate online learning. The philosophy behind this was that if a learner is left in a suitable learning environment, he/she is able to navigate and find a way to learnt by interaction with the various aspects of learning environment. Right scaffolds were provided at the right time. Attitude scale comprise of 20 statements was used to measure the effectiveness
on online constructivist approach. The study revealed that 92% of participants reported web based learning easy to use, 82.35% participants expressed that web based learning is not very time consuming. There was not a very definite opinion as to whether web based learning was less interactive than face to face learning. 70% participants felt that online learning was equally useful and even useful than the face to face learning.

Joseph (2012) adopted three group experimental design to study the “Comparative study of the effectiveness of Computer Assisted Instruction, Constructivist Model and Constructivist - Computer Assisted instruction in learning molecular genetics at the higher secondary school level”. The study taken into considered the pretest-posttest parallel groups design to compare the effectiveness of three type’s intervention. The study was conducted on 232 subjects/students XI standard secondary school students from two schools in Thiruvananthapuram district. The subjects were selected from St. Mary’s H.S.S Pattom and LMS H.S.S., Vattappara schools. The sample was assigned to CAI group (N=74), CM (N=82) and CCAI (N=76). The study was conducted on Biology subject. Researcher developed and adopted the tools namely Computer Assisted Instructional Material, Lesson transcripts based on Constructivist Model (5 E’s Model), Constructivist-Computer Assisted Instructional Material (5 E’s Model Based), Achievement Test, Rating Scale for Higher Secondary Biology Teachers and Questionnaire for Higher Secondary Biology Teachers. Group-1 was treated with CAI, Group-II by Constructivist Model and Group III by Constructivist-CAI. After treatment posttest, immediate posttest and delayed posttest were administered to collect data pertaining to achievement. The data subjected to statistical analysis ANOVA, ANCOVA and t test. The study revealed that there was no significant difference in pre-achievement scores of CAI, CM and CCAI group. There was significant difference in immediate post-test achievement scores of CAI, CM and CCAI group. But there was no significant difference in three groups with respect delayed post-test achievement scores. There was no significant difference in delayed post-test achievement with regard to gender of CAI, CM and CCAI. The study also revealed that CAI, CM and CCAI were
effective with regard to the attainment of instructional objectives of cognitive domain.

CONCLUSION

Review of related literature concerned to integration of technology in constructivist teaching reveals that very less studies were carried out in this field. Pear and Crone-Todd (2002) conducted their study on a social constructivist approach and computer-mediated instruction. Study by Costa, Chaudhari, and Nunes (2011) online constructivist approach. A single study i.e. conducted by Joseph (2012) related to study the comparative effectiveness of CAI, Constructivist Model and Constructivist-Computer Assisted Instruction in science subject. Pear and Crone-Todd found that CAPSI has control over course material engage in knowledge construction and it is flexible approach and it emphasis the students autonomy in constructivism. Costa, Chaudari and Nunes found that online constructivist learning is easy to use and time consuming. Joseph found that there was a significant difference in the immediate post-test achievement scores of CAI, CM and CCAI and all the three methods were effective in the attainment of objectives. From these studies it can be found that there is a much scope to integrate technology for constructivist teaching. These studies were reported in teacher education, biology subject and at the undergraduate level. Thus, it is evident that attempts are not made in exploring the effectiveness of integration of technology in constructivist teaching in teaching social science subject. Hence, the study attempts to fill the research gap in the form of studying the impact of technology based constructivist teaching on academic achievement of secondary school students.

2.6. OVERVIEW

Based on the literature review it can be found that numerous studies have conducted separately in Constructivism, jigsaw and Technology. Also, many studies have considered 5 E’s Instructional modal and Jigsaw are best constructivist approaches in different levels of education and in various subjects. At the same time, very less number of studies reported in teaching social science. However, training module “Rachana” developed by DSERT, Government of Karnataka asserts that 5 E’s Instructional model and Jigsaw are useful model for teaching social science. In one
way 5 E’s Instructional Model adopts systematic approach in engaging students in enquiry based learning, on the other hand Jigsaw supports learner autonomy oriented small group based learning activity. It appears that no studies examined by integrating 5 E’s Instructional model and Jigsaw for developing Constructivist Teaching considering the need for teaching Social Science subject. Thus, there is scope for a study to find out the effect of Constructivist Teaching based on integration of 5 E’s Instructional model and Jigsaw. Similarly existing studies have not attempted to integrate the components 5 E’s Instructional Model, Jigsaw and Technology components into constructivist model to get the benefits of technology components. In this background, the research gap existed helped the researcher to take up the present study to find out the effectiveness of Technology Based Constructivist Teaching on academic achievement of IX standard students.

The previous studies addressed in review of related literature commonly used two group design with comparing constructivist group and control group. In contrary, only countable studies demonstrated research on effectiveness of treatment of two or three methods or approaches or interventions. To name few, Bobola and Afolabi, (2009) studied the effectiveness of guided discovery, demonstration and expository approach; Muhanty and Zubair, (2012) studied the effectiveness of constructivist model and behaviorist model; and Joseph (2012) studied the effectiveness of Computer Assisted Instruction, Constructivist Model and Constructivist-Computer Assisted Instruction in learning molecular genetics at higher secondary level. These studies were very few in number as well as suggest that technology components facilitate the constructivist practice. However they were not conducted in Social Science subject and not integrated the components for developing constructivist and technology based constructivist module. Thus, fast growing demands of technology and constructivist approach indicates that there is opening exists to investigate the effectiveness of Constructivist teaching and technology based constructivist teaching. On the basis of the above discussion and research gap, the present study is considered.

The listed previous studies also gave an insight to the researcher in terms of methodology and also the tools used to find the effectiveness of constructivist teaching and technology based constructivist teaching. The research methodology adopted in the present study discussed in Chapter 3.