

2.1 Introduction

The review of related literature in educational research provides one with a way to get to the frontier in a particular field of knowledge. The researcher is supposed to be aware of what is known with some degree of confidence, and what is accepted as truth by some and not by others. He must have some idea of the nature of unexplored areas where additional research should be conducted. An educationist once said that every creative effort is like a building block that is added to other blocks to build a house. Thus in doing a new study, the researcher has to look at other works that have been done in the area on which he/she is working. The review of literature involves finding, realizing and evaluating research reports as well as reports of observations and opinions which is related to the individual's planned research work.

No research activity is possible without literature search and review. In finding roots of problems, preparing outlines of the study, discussing and interpreting results and writing the research report, review of literature is of most importance. Its benefits are many. No research scholar may be able to develop a conceptual or theoretical framework of his study without making an extensive as well as intensive review of literature. By reviewing his devoted effort to define the research problem in the light of the facts already available and confine the boundaries of the field of inquiry, literature review helps the researcher to make a smooth transition from the past to the present in terms of facts.

The related literature besides forming one of the initial chapters in a research report for familiarizing the readers, also serves some other purposes such as:-

- 1) to know whether the evidence already available solves the problem sufficiently without requiring further investigation and thus to avoid the risk of duplication,
- 2) to provide ideas, theories, explanations or hypotheses valuable in specifying the problem systematically,
- 3) to come up with comparative data useful in the interpretation of results, and
- 4) to add to the general scholarship of the investigator.

2.2 Review of Previous Researches

The researcher tried to find out the needed studies in the area of the use of computer, overhead projector and smartclass in teaching at secondary level schools and during her hunt for related literature, it was found that there was no study reported available which was parallel to the present study. All the studies had either different combination of variables or were taken at different levels and on different samples.

With a view to make an assessment of the previous work done in this area, the researcher searched relevant books, journals dealing with school education and use of educational media, research reports, dissertation abstracts. The researcher also tried her best to review international as well as Indian reported studies necessary for this project.

For collection of reviews related to the research topic, the researcher visited following libraries:-

- 1) Integral University, Lucknow
- 2) University of Lucknow, Lucknow.
- 3) NCERT, New Delhi

- 4) Delhi University, New Delhi
- 5) ICSSR, New Delhi
- 6) Jamia Millia Islamia, New Delhi

In this chapter, the related literature is reviewed focusing on the stated problem. The chapter is divided into three sections as given under:-

- I) Studies related to the use of Computers and Overhead Projectors in education
- II) Studies related to the use of Smart Boards in education.

2.3 Studies related to use of Computers and Overhead Projectors in Education

2.3.1 Indian Studies

Pachaiyappan (2016) studied out the level of attitude towards educational technology among higher secondary school teachers with respect to gender, educational streams, teaching experience and type of management. Survey method was adopted to collect relevant data from randomly selected 250 higher secondary school teachers in and around Chennai. Most of the teachers have moderate level of attitude towards educational technology. With regard to gender, female teachers have higher attitude towards educational technology compared to male teachers. Science teachers have high attitude towards educational technology compared to arts teachers. There is no significant difference in teachers' attitude towards educational technology with respect to teaching experience.

Islahi, Fatima (2013) studied the teaching effectiveness of secondary school teachers in relation to their attitude towards information technology and work motivation. Main findings show that demographic factors exhibit varied influence on teaching

effectiveness of secondary school teachers. Gender, location of school and medium of instruction did not affect the teaching effectiveness while marital status and training did influence teaching effectiveness of secondary school teachers. Unmarried and trained teachers were found to exhibit higher levels of teaching effectiveness as compared to their respective counterparts. Work motivation and attitude towards information technology influences teaching effect of secondary school teachers. Highly motivated teachers tended to have higher levels of teaching effectiveness in comparison to those less motivated. Teachers with a more positive attitude towards information technology exhibited higher levels of teaching effectiveness in comparison to those having average or negative attitude towards information technology.

M., Anitha (2013) studied the perceptions of teacher educators towards application of computers in teaching learning process. The results show that teacher educators have good computer operational skills but the facility to apply and integrate computer education in teacher educational institutions is very nominal. Only teacher educators are utilizing internet in their day to day academic updates. Many of the variables chosen for the study have no significant influence on the perceptions relating to the application of computer in teacher education.

Mahmood, Sadia (2013) studied the influence of personal and institutional factors on attitude of secondary school students towards computer. Main findings of the study shows a strong relationship between students' computer attitude and their socio economic status, with students from low SES background showing a lower computer attitude in comparison to students from higher SES background. Computer attitude of female students is more than that of male students.

Yadav, Vivek (2012) studied about awareness and use of information and communication technology (ICT) by secondary school teachers. The awareness towards ICT was found to be high but use of these tools or practical knowledge found to be low. They are aware and use traditional tool but they are still lacking in use of computers and internet. Awareness and use was seen to be influenced by amount of exposure obtained in government aided and non aided schools. Study emphasizes that many teachers are still not serious about the use of ICTs in classes.

Sharma, B. (2010) studied the effect of ICT on academic achievement and professional interest of 401 B.Ed. students. The study revealed that there was positive correlation between ICT competency and professional interest of B.Ed. pupil teachers. Negative correlation was found between the ICT competency and achievement of students.

Gupta, Surya Narayan (2010) studied about awareness and use of information and communication technology (ICT) by teacher educators. The awareness towards ICT was found to be high but use of these tools or practical knowledge is found to be low. They are aware and use traditional tool but they are still lacking in the use of computer and internet. Female teachers are more aware and use these tools than that of male teachers. Study lays out that B.Ed. course are good enough to make teachers aware of various ICT tools but teachers are not anxious to use them as they scored low in usage.

Negin, D.B. (2009) investigated how students in higher education utilized the ICT facilities to improve learning and he also examined their attitude towards usage of ICT. The results revealed that the students, who had some access to it, utilized the facilities. However it was revealed that most of them had moderate knowledge of the ICT, also they had positive attitude towards the usage of ICT facilities for purposes of studies.

Rajekar, S. and Vaijapuri, R.P. (2008) investigated the level of teachers' computer anxiety. It was found that the entire sample of teachers had high level of computer anxiety. The teachers handling the subject of science and those who had not attended any computer training classes had high computer anxiety than their counterpart in the arts group.

Mehra, V. (2007) determined the attitude of the school teachers of Chandigarh towards use of computer technology for instructional purpose. He also explored the perception of 200 Government Senior Secondary School Teachers of Chandigarh with respect to computer attributes, computer competencies and their access to computers. The findings revealed that teachers possessed fairly positive attitude towards computer use but majority of them needed to be provided training for using computer in instructional settings.

Shankar, S. P. and J. Subasri (2006) analyzed accessibility of PowerPoint presentations among the high and higher secondary school teachers in classroom teaching in selected schools of Pondicherry state. The total sample size of the study was 80 teachers, with different age groups, gender, educational qualifications, specializations, computer knowledge and viability area and school. The study was done at random in selected government and private schools in Pondicherry state. For data collection, a questionnaire was provided to all respondents. Findings of the study revealed high significant relationship between the fundamental knowledge of computers among the teachers and PowerPoint accessibility in classroom teaching. The level of adaptability towards PowerPoint utility in classroom teaching was found to be more with the science teachers when compared to that of the teachers teaching Arts

subjects. There was no significant difference between the high school and higher secondary school teachers in using the PowerPoint presentations in classroom teaching.

Shah, Irfan(2005) conducted a research to study the ICT awareness of secondary and higher secondary teachers, to study the ICT use of secondary and higher secondary teachers, to study the ICT need of secondary and higher secondary teachers, and to study the variables related with the ICT awareness, use and need of secondary and higher secondary teachers. A scale was constructed to collect the data regarding ICT awareness, use and need of a teacher with respect to different components of ICT, like, computer, Internet, OHP, LCD Projector, Radio, TV. 12 secondary and 10 higher secondary schools were selected using stratified random sampling technique. Further 60 secondary and 50 higher secondary teachers were selected @ 5 teachers from each selected school. Data were analyzed using frequency, percentage, mean, SD, SE of mean, *t*- value and ANOVA wherever necessary. There was found a low degree of ICT awareness, use and need of secondary and higher secondary teachers. The variables related to ICT awareness of teachers were teaching experience, age and total salary. The variables related with the ICT use of teachers were total salary and computer training. The variable related with the ICT need of teachers was the Degree Program which they attended at the University level.

Pandian, S. Sivaraj (2003) studied the effectiveness of computer assisted instruction in Biology at secondary school level. The students of the experimental groups using CAI in biology units had achieved significant mean scores than their counterparts in the control group not using CAI materials for the classes VIII and IX in both the schools. Gender was found to be non significant as the result of CAI between the boys and girls

of experimental group. Gender had no significant influence on the attitudes towards biology in general at school level. When the effect of CAI was seen on the attitudes towards computers, significant mean difference had been noticed between the students of experimental and control groups in general. Gender was found significant as the result of CAI treatment. This trend was also noticed among the males and females as the experimental groups significantly outperformed their counterparts on the attitude towards computers over the control groups respectively.

Joy, B.H.H. and Manickam, L.S.S. (2002) assessed the knowledge in computer and CAI and teacher competencies of science teachers. They found that there was no significant difference on the teacher competencies in the pre and post scores or between the experimental groups. There was significant difference between the groups in their attitude towards computer education as a result of training in computer education. There was correlation between age and attitude towards use of computer. There was significant difference in the pre and post scores of the experimental group on knowledge in CAI and attitude towards use of computer.

Sharma, R.C. (1993) studied the effect of four classroom presentation modes on science achievement. The study compared the effectiveness of four presentation modes on science achievement of 160 secondary school pupils. The four presentation modes were: - a) demonstration video instruction, b) video instruction, c) teacher's discussion and d) self experimentation under teacher's guidance. A pre test post test design was employed and the science materials (lesson plans and video lessons) were specially developed by the researcher. The results indicated that video instruction followed by discussion produced higher achievement than other methods.

Antonysamy, L. (1989) investigated whether working children in the non formal education centres achieved more when taught environmental concepts by the video method than by using charts. The major **findings** of the study were the school dropouts taught by the video method learned more concepts on environment than those who were taught by using charts. The working children improved their achievement on ‘Environmental Concepts’ after viewing the video programme.

2.3.2 Abroad Studies

Hamzah and Ahmad (2016) studied the relationship between instructional media with students’ attitude on History subject, based on gender. A total of 200 students were selected as respondents from several schools in the district of Hulu Langat, Selangor. One set of questionnaire was employed to measure the tendency of students’ usage of instructional media. The *t*-test showed that there is a difference between the use of visual learning and audio visual learning based on gender. The Pearson correlation indicated that there is a significant relationship between instructional media with students’ attitude towards History subject.

Ndibalema (2014) studied about teachers’ attitudes towards the use of ICT as a pedagogical tool in secondary schools in Tanzania. The data collection methods involved questionnaire and interview. It was found that teachers have positive attitudes towards the use of ICT as a pedagogical tool but they did not integrate in their teaching effectively.

Joseph and Rotumoi (2014) investigated the varieties of instructional materials that are available and used for teaching the novel in selected secondary schools in Baringo district. Evidence and deduction from data analysis revealed that most of the schools

had some of the recommended novels and very few of the non book instructional materials for teaching the subject.

Nouri, H. and A. Shahid(2008) conducted a study to explore whether providing lecture notes when PowerPoint is used for class presentation affected student performance and attitudes toward instructor. This study was conducted in a classroom setting throughout the semester. The experiment involved two sections of an Accounting Principles I course. The results showed that students who did not receive PowerPoint lecture notes indicated that the instructor was more effective and efficient than students who received PowerPoint lecture notes. No differences were found between the two groups in evaluating the instructor on such attributes as preparedness, caring about students and feedback. The results further indicated that providing lecture notes did not appear to affect.

Barton, R. and Haydn, T. (2006) explored the views of initial teacher trainees on various components of their training in the use of new technology to teach their subject. The research focused on trainees reflections on their experiences of trying to ‘get better’ at ICT in the course of their training. In spite of the importance attached to this facet of initial training and significant investment in terms of time and training materials and resources, there was evidence to suggest that much of this investment was not found to be helpful by trainees. In particular, there appeared to be a danger that they had simply been overwhelmed with information about the use of ICT to such an extent that they did not feel that they could realistically be expected to engage with many of the materials that had been produced.

Chem, L.M.Y., Jones, A.C., Scanlar, E. and Joiner, R. (2006) investigated the use of ICT in music classrooms, with focus in secondary school music curriculum in the UK. The study focused on two aspects highlighted in the National Curriculum for England for Music (1999) which suggested that basic music notation and keyboard skills formed a part of pupil's musical learning experience and that such practical skills supported classroom musical activities like performing, listening and composing. The study was carried out in a British Secondary School using a commercial CD entitled "Teach Me Piano Deluxe", designed to teach music practical skills. The findings revealed a significant improvement in reading music (staff) notation and rhythm due to ICT.

Jereb, Eva and Smitek, B. (2006) conducted a survey among students who used the multimedia instructions in their course. Students involved in the survey found the lessons understandable and systematic, very interesting and very carefully prepared. They felt that these lessons would enable them for further independent study. They were enthusiastic about the self- assessment tests, which helped them to find out whether the information learned was right or wrong. The study showed that students were satisfied with this kind of studying and were looking forward to using computer-based multimedia learning material for other subjects as well. The study showed that the use of multimedia instructions added variety to the study and increased the quality of an individual's work and the motivation of learners.

Postholm, M.B. (2006) showed how teachers performed their role, and how they acted and talked when pupils work on task using ICT in project work. Classrooms processes were studied using the qualitative case study method and data were collected throughout the project periods in the classrooms. The comparative method was used to

analyse the data. Findings of the study showed that ICT in no way took over the teacher's role, but rather than this tool could mediate interactions between pupils and teachers. The teacher had to function as an advisor in the classroom by organizing, structuring the activity and 'scaffolding' the pupils in dialogues with them. The study also showed that pupil's activity, as in project work, was necessary to exploit the various possibilities of ICT, but the teacher had the key role in making this possible.

Apperson, Laws, and Scepansky (2006) showed that college students enrolled in classes in which the professors used PowerPoint with lectures reported more interest in the class, an easier time paying attention, and greater learning when compared to the same classes in which the same professors used only chalkboards.

Irma, E., Anouk, B., Monique, V. and Geert (2005) discussed the results of a literature review on gender, ethnic and socio-economic status differences related to ICT in primary and secondary education. The review was conducted in order to develop an index for analyzing the inclusiveness of educational ICT applications. The research question was: 'How and to what extent do the characteristics of educational ICT tools enhance or inhibit learning for different group of students. The large majority of the articles found concern gender differences, with a more limited number of publications focusing on race/ethnicity and a few discussing socio-economic or class differences, often under the broader headline of equity. Studies taking an integrated approach to gender, race and class were scarce, as Sutton (1991) and Volman and Van Eck (2001) had already remarked. A great variety of ICT applications were discussed in the literature, for example, drill and practice or instructional programs concerning specified subject matter, Internet/web based programs, computer mediated communication

(CMC) and integrated learning environments. Many of the empirical studies were small scale for instance, on the experiences of different groups of students while working with ICT tools or case studies in which it was investigated as to how ICT was used in diverse classrooms. The majority of the literature had a prescriptive character and formulated guidelines for the development and use of educational ICT tools based on a theoretical analysis of the learning needs and preference of particular social groups. There was a general lacuna in research on ICT and education concerning the relationship between learning outcomes and the use of ICT (example, Wilson 1999; Bain et. al. 2000) and they found hardly any studies that linked the issues of the characteristics of the design of educational ICT tools to the learning outcomes of students.

Smeets (2005) investigated the characteristics of learning environments and the contribution of ICT to learning environments. Even though 93% of the teachers who filled out the questionnaires applied ICT in their classes, the use of ICT in general remained disappointing, the emphasis being on skill-based applications that fit into traditional views of teaching and learning. Only a minority of teachers used open ended ICT applications that could stimulate the pupil's information processing skills, the emphasis in ICT use was on remediation tasks for low achieving pupils, whilst the potential of stimulating high achieving pupils by means of ICT was found to be neglected by many teachers. Apart from this, whereas four out of ten teachers felt that ICT provided a fair or a substantial contribution to co-operative learning, the use of ICT for supporting co-operative learning was reported to be quite limited. Most of the teachers did not make use of the potential of ICT to contribute to the power of learning environments. Thus, computers were used mainly to complement rather than change

existing pedagogical practice. Male teachers appeared to favour open ended use of ICT more than female teachers did. The power of the learning environment and the availability of a sufficient number of computers contributed most to the probability of the use of open ended ICT applications. The studies suggested that in order to further optimize learning environments in primary education, teachers should be aware of the potential of ICT to contribute to the power of learning environments and to stimulate pupils' active and autonomous learning. Moreover, teachers' skills with regard to the use of ICT as a means to support powerful learning environments should be fostered.

Sussikind, J.E. (2005) studied the effects of non interactive computer assisted instruction on students' performance, self-efficacy, motivation and attitudes. The results of this study pertained to the difference between the students' subjective and objective performance. The results implied that accompanying lectures with power point presentations did not significantly affect students' achievement. Both students' responses to the attitude questionnaire and their open ended comments reflected greater positive attitudes and self-efficacy beliefs when power point accompanied lectures. The study further revealed that students who received traditional instructions first and then received lectures with power point did not experience a change in classroom motivation. However, students who were initially taught with power point and then received traditional lectures became less motivated during the traditional lecture format.

Volman, M., et al. (2005) investigated issues related to the use of ICT in seven Dutch schools, in which gender and ethnic differences had been identified, mainly computer use in and out of school, computer skills learning outcomes when ICT was used,

pupils' attitude towards ICT and their way of working with computers. It was found out in secondary education that the computer attitude of girls seem to less positive than that of boys, girls and boys took on different tasks when working together on the computer and they tackled ICT tasks differently. Pupils from ethnic minority background in both primary and secondary education appeared to consider themselves to be less skilled ICT users from the majority population. The study further found ethnic differences in participation in ICT activities at school in both educational sectors. Pupils from an ethnic-minority background used the computer at schools less for gathering information and preparing talks and papers and more for drill and practice. Differences between pupils from an ethnic-minority background and from the majority population in access to certain forms of ICT use out of school were confirmed at school instead of being compensated for.

Nouri, H. and A. Shahid. (2005) conducted a study to test whether using PowerPoint in an accounting course enhanced student short-term memory, long-term memory, and attitudes toward class presentation and the instructor. An experiment was conducted which includes a treatment-control design, in a classroom setting throughout a semester. In one section of an accounting principles II (Managerial Accounting) course, 60 PowerPoint was used as the delivery system, while the second section was taught using the traditional delivery system. The results showed that Power-Point presentation may improve student attitudes towards the Instructor and class presentation. The results did not provide conclusive evidence that PowerPoint presentations improved short-term or long-term memory. The latter results are consistent with other media comparison studies that show the medium alone does not influence learning.

Muir-Herzig, R.G. (2004) determined the effect that the level of computer technology use in the classroom had on at-risk students' grades and attendance. Results of the study indicated that technology use was low among the teachers in the sample. These results indicated significant positive effect on the grades and attendance of at-risk students. The author suggested that leaders need to develop a model that would include a shared vision, entire school community involvement, specific training for staff and time for the training, a full time technology director and time for staff to communicate and share among peers for technology to be an effective tool in the classroom curriculum.

Mooij, T. (2004) described the scope to optimize instruction and learning through adequate multilevel integration of ICT including computer use for learners, in particular for learners at risk in Dutch secondary schools. The study asked which curricular, instructional and ICT characteristics could be expected to optimize learning processes and outcomes and how to best achieve this optimization. The study reported that the process to realize multilevel transformation and optimization of education could adopt different forms in different countries, depending on national or other circumstances. It further revealed that successful optimizing transformation of education would require a long term, gradually broadening collaboration between those persons and the institutions involved in the innovation of educational practices and instruments, at an increasing number of levels, within and outside the educational system.

Rasku al. Puttonen, H. et.al. (2004) aimed to find out how teachers develop their practical knowledge and expertise through shared planning and to evaluate an innovative learning project carried out in an ICT based environment. Findings of the

study revealed that the teachers spent more time on planning than was required for other lessons. The teachers reported that before the lessons they searched relevant data banks, web pages and other appropriate information sources and knowledge bases for materials for the students. While instructing their students the teachers had to reflect continuously on their learning and teaching activities. Collaboration made it possible for teachers to establish more personal contact with their students and to monitor the strategies these applied during learning activities. The teachers participating in the study judged that ICT enhanced the motivation of their students. The study indicated that teachers' reflection on their practices might result in increased awareness of their own practices, shared planning and evaluation of the teaching-learning process created an appropriate context for teachers' professional learning. The authors argued that teachers need personal experience with the use of ICT if they were to make them an essential component of the learning environment.

Zain, M.Z.M., et al. (2004) investigated the impact of ICT on the management practices in 36 Malaysian schools. It was designed to be answered by the school principals or senior assistants of the schools that participated in the Smart Schools Pilot Project (SSPP). The analysis revealed that the impact had resulted in changes that included the enrichment of the ICT culture among students and teachers, more efficient student and the teacher administration, better accessibility to information and a higher utilization of school resources. This analysis also revealed that time constraints, higher administrative costs, negative acceptance/support from some untrained staff, abuse of the ICT facilities and problems related to the imposed rigid procedural requirements were among the challenges encountered by the schools. According to the authors, the key challenge remained the transformation of the traditional learning environment into

a new learning environment that necessitated the teachers to change their teaching pedagogy from that of knowledge instruction to knowledge construction. While the head of each institution at the agency, federal, state, district and school levels was the driver of the implementation, the study showed that the success required the full support of parents and the community.

Blokzijl and Naeff's (2004) surveyed 69 Dutch students' reactions to PowerPoint as a tool and to lectures using PowerPoint instead of overhead transparencies. These students preferred PowerPoint over transparencies and liked the slides with large font sizes, unity in layout, and easy-to view color contrasts. Not surprisingly, these are the same features that teachers and authors emphasize when teaching effective PowerPoint presentations.

The study of **Bartsch and Cobern (2003)** noted that students preferred PowerPoint over the use of OHP(T), but that in some instances the content of the PowerPoint presentation distracted students and they performed less well on tests compared with a control group.

Selwyn, Neil and Kate, Bullon (2000) examined the factors underlying and influencing primary pupils' perceptions and orientation towards using ICT within the primary curriculum. Most children were positive about the idea of using computers. The data also revealed that although the vast majority of pupils were making some use of computers in school, patterns of sustained and varied engagement within which ICT was presented to pupils and then regulated by the teacher as gatekeeper were continuing to curtail many children's perceptions and use. The study showed that teachers' reliance on the computer as 'pacifier', especially in early years' classrooms,

certainly excluded many children from engaging with ICT. The disparities in pupils' access to the 'computer culture' were even more marked outside of school. The authors argued that given the disparity of experience and access to ICT outside of school, the primary school more so than ever had an important role in ensuring that as many pupils as possible were engaged in sustained meaningful and equitable use of ICT.

Szabo and Hastings (2000) carried out an extensive study comparing PowerPoint and OHP and observed no difference in student performance in tests. The most important factor was lecture subject difficulty in determining the students' performance in these tests. They concluded that the efficacy of using PowerPoint was case specific rather than universal.

Lowry (1999) in a study of 390 students enrolled in three sections of an Environmental Science course, found an 8% point increase in the students in the PowerPoint cohorts. Lowry did not give the same test to all three sections, only in the same format of the test, the students preferred PowerPoint over transparencies.

Evan's (1998) in a pilot study of 161 students taking a General Psychology Course, found that students performed better (roughly 4 percentage points) with PowerPoint presentations as opposed to lectures with overhead transparencies, and the liked PowerPoint better than transparencies .

Robertson, S.I. et al., (1995) investigated the computer attitudes of secondary students and teachers to ascertain what differences were there between groups (male and female, student and teacher). The results supported that there are differences in attitudes between the boys and girls in the survey, with boys expressing more favorable attitudes than the girls. However, there were no differences in computer anxiety and computer

liking between them. There was no significant correlation between the respondent's previous use of computers and the confidence, competence or cognitive attitude subscales. The staff appeared much more anxious about using computers than the students. The students expect to learn about, and from, computers more than staff did.

Wang, Pien and Pui, San Chan (1995) investigated two important issues: first, what the teachers perceived to be the major advantages and disadvantages of implementing Computer Assisted Instruction (CAI), second, what they perceived to be the major facilitators and inhibitors of CAI implementation. Results showed that immediate feedback to students and provision of alternative teaching techniques were the major advantages of CAI, whereas isolation from human interaction and large capital investment were the major disadvantages. The results further highlighted that support from the Ministry of Education, availability of teacher's time and resources, as well as provision of administrative support facilitate CAI implementation. However, lack of time, few computers and skills in education technology were considered to inhibit CAI implementation.

Collins, A., Hokins, J. & Frederiksen, J. (1993) conducted a study on three different views of studies and the role of technology in assessing student performance. On the basis of the findings, the authors argued that pencil and paper testing techniques systematically prejudice assessment of students and their views. Computers can provide very different views on student performance. The investigators explored different aspects of student performance and the kinds of criteria that might be assessed using video and computer. The investigators recommended that educators should rethink student assessment in the light of these new media.

Nicole Amare, analyzed the performance and attitudes of technical writing students in PowerPoint-enhanced and in non-PowerPoint Lectures. Four classes of upper level undergraduates (n = 84) at a mid-sized, Southern University taking a one-semester technical writing course were surveyed at the beginning and end of the course about their perceptions of PowerPoint. Of the four sections, two classes were instructed using traditional lecture materials (teacher at podium, chalkboard, handouts); the other two sections were instructed with PowerPoint presentations. All four classes were given the same pre- and post-test to measure performance over the course of the semester. Traditional lecture or PowerPoint presentations consisted of at least 50% of the course, with the remaining time spent on exercises and small group work. Results revealed that while most students preferred PowerPoint, performance scores were higher in the sections with the traditional lecture format.

2.4 Studies related to use of Smart Boards in Education

2.4.1 Indian Studies

Singh, Garima (2013) did a comparative study on the effects of traditional class and smart class on the achievement and attitude of secondary school students. Students who were taught through smart class had high achievement than the students who were taught through traditional classes. No significant difference in the attitude towards utility and significance of smart classes in relation to gender and socio economic status was found.

Jena, Prakash Chandra (2013) studied the effect of smart classroom learning environment on academic achievement of rural high achievers and low achievers in science. There exists a significant difference in the effect of smart classroom learning

environment on academic achievement of low achievers of secondary students in science. There exists a significant difference in the effect of smart classroom learning environment on academic achievement of high achievers of secondary students in science.

Mathur, Archita (2012) studied about attitude of teachers and parents towards smart classes. Parents and teachers are much aware of the given technology Parents like the use of smart classes in the schools. Very few teachers do not like the concept of smart classes. Number of parents having the negative attitude and number of parents having neutral attitude is same.

Dun and Bradstreet [D&B] Information Services India Pvt. Ltd. (2010) assessed the usefulness and effectiveness of 'Educomp Smart Class' program for enhancing students' academic performance and teachers' productivity in classroom. On the basis of observations carried out by D&B, it can be stated that the advantages of a Smart Class technology outweigh those of a traditional classroom. Teachers and principals were of the opinion that while the Educomp Smart Class program definitely impacts both students and teachers in a positive way, ideally teaching should be a mix of the program and traditional methods. Finally, it was almost universally agreed that the effectiveness of this technology was fairly visible. However, for teachers with greater teaching skills and experience, the effectiveness was higher.

2.4.2 Abroad Studies

Korkmaz, O. & Cakil, I. (2013) studied the teachers' difficulties about using smart boards. The purpose of this study is to determine the reasons why teachers do not utilize smart board technology within the teaching- learning process, although they

have the necessary means. This is a qualitative study conducted in scanning model where descriptive method was used. A total of 17 teachers constitute the study group. Data of the study were collected by means of an interview form formed of semi structured questions in line with the open-ended question technique. Collected data were evaluated through document review method. At the end of the study it was concluded that: In general, teachers find smart boards useful, but do not utilize them adequately. It was stated by the teachers that the most important reason for this is the fact that they do not know how to use these tools.

McCarthy, B., Atienza, S., Tir, M. and Yumal, D. (2012) conducted a five month pilot test of various Tran media gaming suites for the Corporation for Public Broadcasting (CPB) and the Public Broadcasting Service (PBS). Tran media gaming suites are comprised of thematically linked content presented across formats (e.g., short-form videos, on-line games, mobile phone activities, in-classroom digital games) and across media devices (e.g., computer, interactive whiteboards, tablets, mobile digital devices). The goals of the pilot testing were to identify early evidence of student learning and engagement with the content, to determine usability and technical issues, to provide recommendations for the next round of product development, to elicit teacher's perceptions of the suites, and to understand how Tran media gaming suites fit into the classroom environment. The use of SMART Boards was critical to the success of the pilot testing. This study found that SMART Board usage in the classroom is associated with increased student engagement, collaborative work and motivation and increased familiarity with and curiosity about different forms of technology.

According to **Giles, R. M. & Shaw, E. L. (2011)** SMART Board is a technology that combines the functionality of a whiteboard, computer, and projector into a single system. The interactive nature of the SMART Board offers many practical uses for providing an introduction to or review of material, while the large work area invites collaboration through social interaction and communication. As a result, SMART Boards are an effective means of augmenting typical teaching strategies to make science learning more motivational and meaningful for the internet savvy, technologically advanced youngsters who populate the elementary classrooms. When a group of kindergarten students was introduced to rock types--igneous, sedimentary, and metamorphic--using the SMART Board as an instructional tool, their enthusiasm was obvious and their interest was evidenced by their rapt attention. The integration of SMART Board instruction in science may boost teachers' comfort level with teaching science and, as a result, increase the amount of science being taught, the enjoyment of the lessons, and the students' success with concepts being conveyed.

According to **Manny-ikan, E., Tikochinski, T. B. & Zorman, R. (2011)** in 2008, an educational organization that works in 60 countries across the world, established a pilot project whereby smart classrooms were installed for use in six middle and senior high schools in Israel. In this project, each school received 10 Interactive White Boards (IWBs) (25% of the total number of classrooms in the school), 32 laptops, internet connection, communication software and teacher training. Formative evaluation accompanied the pilot project for two years in order to examine the effects of integrating technology into instruction on teachers, students, and the school community. The findings indicated the following: a) student motivation and engagement in the learning process increased when studying with the IWB; b) teachers

reported on their professional development and enhanced technology skills. The findings also showed that the integration of technology into instruction posed some difficulties and challenges, such as a sense of over-burdening among teachers. The main conclusions were the following: a) there is a need to focus on the pedagogical training of the teachers, with an emphasis on the ways that technology can assist interactive teaching; b) in order to help relieve the over-burdening of teachers, a database of instructional tools should be established providing suggestions for lesson plans and instructional materials; c) accessibility to the technology should be extended to more teachers and students by adding smart classrooms to every school in the project.

According to **Meng, H. J. (2011)** in order to understand the realistic use and impact of interactive white boards (IWB) on ICT in Taiwan, a survey was used to gather information on teachers' perceptions. The technology acceptance model was used as the theoretical basis in this study. Collected data were analysed using the structural equation modelling technique (SEM). A total of 335 questionnaires were retrieved from 114 rural schools, a return rate of 62.28%. The confirmatory factor analysis (CFA) test by SEM showed a satisfactory model fit to the hypothetical model. Important results were: 1) Perceived ease of use (PEU) has a positive and direct impact on perceived usefulness (PU), indicating that IWB are favoured by teachers and encounters zero resistance; 2) PEU and PU both have a positive and direct impact on behavioural intentions to use (BI), indirectly suggesting that greater convenience and practicability of IWB can increase teachers' intention to use IWB; and 3) Behavioural intention to use IWB has a direct impact on actual system use, which demonstrates that IWB-based

teaching environments already have been widely integrated by teachers into their teaching methods.

Egeberg, G. and Wolner, T.A. (2011) did a study that focused on teaching by means of IWBs (Interactive Whiteboards), classroom management, communication and evaluation. The **results** showed that teacher's role is transformed by the teacher increasing classroom interactivity and pupil involvement through pupil activities and new form of communication. IWBs help clarify educational goals and contents and facilitate learning, and that teacher makes educational changes when planning and carrying out lessons with IWBs. IWBs strengthen pupil teacher communication as there is less teaching and more dialogue between the teacher and his or her pupils. IWBs and an emphasis on interim evaluations enable a greater degree of differentiation and adapted education for both strong and weak pupils, which in turn stimulates the pupils to reflect on their own learning.

Jacobsen, M. and Davis, B. (2011) investigated the use of the SMART Response XE interactive response system including two receivers and 200 remotes (clickers) in a large group learning environment to engage, monitor and extend the thinking of pre-service teachers. The result show that the use of the interactive response system increased student engagement, positively impacted the professor's teaching strategies and helped students understand the diversity in thinking, it improved the quality of interaction of students and created more opportunities for discussion and enhanced their understanding of lecture content.

Hashmei, S.S. (2011) studied how students learn by using new digital tools such as an interactive whiteboard in the classroom and to develop, test and implement new

teaching methods in the subject of Swedish and mathematics. There was also an interest to study inclusion and how a digital learning environment affects students' motivation. Two schools in the municipality of Uddavella and researchers from the University West formed the sample. The introduction of interactive whiteboard meant a general move towards a more conscious effort on an ICT-enhanced teaching at the two schools. The aim in the subject of Swedish to develop students' textual competence and linguistic awareness has resulted in that students have had the opportunity to meet and develop language in different contexts. Also the teachers have through the lesson material with interactive features and access to current information on the Internet given the students the opportunity to come across texts of different formats and modalities. It has been motivating for both students and teachers to get a new, interactive tool in the classroom, which has begun to be used frequently in teaching and that many students experienced as a tool especially facilitating learning and encouraging to activity and dialogue in the classroom. Both teachers and students have developed digital competencies on several levels in the process of introducing the interactive whiteboard in classroom practice.

Holder, Ryan W. DMA (2007) studied the past, present and future use of technology in university conducting classes. Furthermore, the researcher attempted to develop and implement a more effective method of teaching using Blackboard combined with digital video technology assist in the documentation, critique and self evaluation of first year conducting classes at the university level.

Zhao, Jiangtao (2006) conducted a study to examine faculty members' use of smart classroom technologies and to test the validity of the Technology Acceptance Model

(TAM) and the extended TAM in predicting faculty's intention to use smart classroom technologies in a research university setting. The study found that TAM was valid in predicting faculty's intention to use smart classroom technologies. Survey findings also revealed that large screen projection was the most frequently used technology, the presentation remote controller, the second, and the audio player was the least used technology. No significant difference on faculty's use of smart classroom technologies was identified based on gender, rank and status, except, age. The majority of the respondents commented that teaching with smart classroom technologies was better than teaching in a traditional classroom.

Fortuna, C. (2007) examined how SMART Board interactive whiteboard technology enhances students' reading, knowing, viewing, speaking and learning. Learning events included using SMART Board interactive whiteboard technology at least twice a week in addition to curriculum-mandated textual assignments. Six case studies were taken. SMART Board interactive whiteboard technology allows students to view and represent. It contributed to an ability to comprehend, use and control the symbol systems of both print and non print media, as well as understand the relationship between them. SMART Board interactive whiteboard generated much excitement in students who were otherwise detached from a prescribed curriculum, it created unique instructional opportunities and literary objectives to be obtained in a technology-deprived public school building; and it endangered constant multimodal connections to students own lives.

Oleksiw, T. (2007) aimed to find a variety of ways that SMART Board technology could be used to amplify third grade students' math skills according to state standards.

Would the implementation of math problems presented differently on the SMART Board unit benefit the students' understanding of how to solve them? The SMART Board interactive whiteboard truly proved to be an effective tool that amplified motivation, stimulation and understanding in math.

Mc Neese, M.N. (2006) assessed the university's technological needs and evaluated how well those needs were met over the life of the grant. Faculty characterized students as more attentive, more willing to participate and more engaged in various types of instruction in the SMART classrooms. Faculty described students of grasping learning objectives more quickly and easily in this environment. The SMART classrooms allowed faculty to meet the needs of students with different learning styles. Students reported feeling more comfortable with e-learning after this type of introduction of the hybrid online courses in the SMART classrooms making them more likely to enroll in fully online courses in the future. SMART classroom environment has improved student face to face participation and e-learning.

Beeland, W.D. Jr (2006) did an action research to determine the effect of the use of interactive whiteboard as an instructional tool on student engagement. A total of ten middle school teachers and 197 students participated in the study. The results of this study indicate that the use of interactive whiteboard in classrooms does lead to increased student engagement; the primary reason appears to be the visual aspects of using the whiteboard.

Fogarty, Ian (2005) compared the performance of small groups completing learning activities on SMART Board interactive whiteboards to groups completing the same activities on laptops. The study showed that using an interactive whiteboard as a

collaborative, student-centered tool is particularly effective for learning activities that are discussion oriented, less structured and cognitively challenging. Using SMART Board interactive whiteboards during small group learning activities promotes collaborative conversation, successfully engages more students in group work and improves the learning outcomes of students. The interactive whiteboard encourages every member of the team to contribute to collaborative conversations. When the interactive whiteboard is used as a student centered tool, significant gains in student performance can be achieved, particularly for activities that are cognitively challenging and require student discussion.

Gerard, F. and Widener, J. (2004) investigated the use of SMART Board interactive whiteboards in foreign language classrooms. They had an impression that SMART Board interactive whiteboard is a very innovative and powerful support for language acquisition. It provides a bridge that allows using the features of computers without breaking communication. It may enhance new kind of learning processes. On the practical side, the SMART Board interactive whiteboard offers a very interesting option for bringing the Internet into every foreign language class. The Internet, and the access it provides to authentic documents, is the biggest revolution in foreign language teaching/learning in the last few years. A SMART Board interactive whiteboard brings this interactive feature into the classroom without involving the cost of having one online computer for every student in the classroom.

Huck, K. and Schmitz, D. (2004) examined how teachers can enhance curriculum with the inclusion of technology built into a specific course of study. They wanted to explore how educators could use the SMART Board™ interactive whiteboard as an

extension of student learning and also how the use of the SMART Board interactive whiteboard impacts students learning in the language strands of listening, speaking, reading, writing, viewing and representing. Teachers showed enthusiasm towards the potential of the SMART Board interactive whiteboard in the classroom. The technology provided high levels of peer interaction and collaboration.

Mc Neese, M.N. et al. (2003) examined whether gender differences exist among college faculty, staff and graduate students (FSG) in terms of participation in and the acquisition of SMART Board interactive whiteboard training sessions. The study centered upon 26 FSG who participated in SMART Board interactive whiteboard training sessions conducted by the University of Southern Mississippi's (USM) Centre for Education and Learning Technology (CELT). The findings showed that research question focusing on attendance, participation and practice demonstrated female FSG domination. The male participants find the SMART Board interactive whiteboard to be less valuable in the instructional setting. There were no differences between the genders in terms of comfort level, instructions given in the training sessions and the desire to use the SMART Board interactive whiteboard in the future. Researchers conclude that based on the SMART Board interactive whiteboards user friendly features and advantages as perceived by most of the participants, this emerging technology can have a widening impact upon educational instruction.

Preisig, J.K.D. (2003) investigated the effects of the SMART Board interactive whiteboard on student performance and motivation in a math class. Specifically, this study aimed to discover if the use of the SMART Board interactive whiteboard would improve students' knowledge and understanding in the area of fractions and number

relationships, further developed higher order thinking skills and increase student motivation to learn about fractions. It was hypothesized that the SMART Board interactive whiteboard would increase student performance and motivation among sixth grade math students. The SMART Board interactive whiteboard demonstrated an ability to improve student performance and motivation in the area of fraction and number relationships. The researcher observed an increase in students' enthusiasm and excitement during lessons involving use of the SMART Board interactive whiteboard.

Tate, Linda (2002) examined the degree to which the use of Internet and presentation technologies (delivered via an electronic whiteboard) in a required general education American literature survey course affects student retention, attendance, participation, interest and success. Although there was no significant difference in student performance, students in the technology-enhanced sections self-reported more enthusiasm and interest in the course than did the students in the traditional sections, and perhaps as a result, the retention rate in the experimental sections was much higher than in the control sections.

Clemens, A., Moore, T. and Nelson, B. (2001) successfully integrated SMART Board technology into classroom instruction. The researchers did not teach computer skills, but used the computer to teach their curriculum standards. This seamless integration of technology and curriculum was made possible because of SMART Board technology. Students were able to clearly see from their seats the computer display predominantly projected on the SMART Board. The sample consisted of six girls and fourteen boys of first grade class. The students excelled in the areas of mathematics where the SMART Board was used for instruction. Regarding the attitude of students towards math and

their comfort level towards technology, 100% of the students preferred using SMART Board and other forms of technology as opposed to traditional paper and pencil methods of instruction. Based upon the significant growth, academic achievement and positive attitudes towards the specific skills taught, the SMART Board used as a tool in combination with effective teaching strategy, brought about dramatic results.

Roennigke, P. and Carter, S. (2001) studied on developing self directed learners and teachers as facilitators with SMART Board interactive whiteboard technology. The objective was to facilitate the students in the use of the Internet in self directed learning projects and to develop their presentation skills. Two groups were created from the Enhanced Learning Program. Group A consisted of eight students who were to do a self-directed project on a topic of their choice utilizing technical tools already in place, such as Internet access, Power point, Word and an LCD projector, and the SMART Board technology for their presentation. Group B consisted of eight students from the self-directed project who would use only the technology already in place. The results show that the authors feel confident that these students are equipped to continue independent learning because of this project. They have learnt to do research via the Internet and work with teachers and peers.

Solvie, P.A. (2001) investigated the correlation between use of the digital whiteboard as a delivery tool for literary instruction in a first grade classroom and student attention to and participation in the literary lessons. A study was conducted in a first grade classroom involving 16 students. Analysis of data revealed here was no significant difference in student attention when lessons were presented with the SMART Board as compared to students' attention to lessons presented without the SMART Board. An

explanation for this may be that additional variables exist which may effect student attention to the reading lesson. Other props and materials, such as pencils, books and cards as well as other visuals in the classroom drew students' attention away from attention to the lesson. Also student position or seating arrangement may affect student attention

Weimer, M.J. (2001) determined whether students would report being more motivated to learn using a SMART Board than when they were not allowed to use any technology. The objective was to determine whether the use of technology motivate students. The results indicate a link between the use of technology and the motivation of students in the classroom.

Breazeale, R.H. and Blanton, B.L. (2000) determined the effectiveness of the SMART Board technology intervention on the social behavior of students with emotional behavior disorders. The total population consisted of 60 students enrolled in the middle schools who completed participation consent forms. Three of the groups received varying components of the SMART Board, social skills training and cognitive/behavioral counseling, while one group received no treatment. The result showed that the SMART Board technology had a significant effect on the first group's acquisition of appropriate and social behavior(s).

According to **Elvers, G.C. (2000)** digital whiteboards offer the ability to record what is written on them, and this information can then be placed on the World Wide Web. This might free some of the students' time from taking notes and might allow the students to process information more deeply, which might lead to better retention and comprehension of the material. Conversely, the students could stop taking notes and

stop thinking, which might lead to worse retention and comprehension of the material. The results failed to reveal the predicted interaction between section of the class and exam such that those with web-based access to the whiteboard information should perform better than those without access. Several possible explanations for this result are ruled out. It is possible that the students did not regularly use the web-based copies of the information written on the whiteboard and thereof could not benefit from them. Students who more frequently used the web-based copies of the information written on the whiteboard might have paid less attention in the class.

Howse, E., Hamilton, D. and Symons, L. (2000) investigated the effects of SMART Board on nursing students' academic performance, group learning processes and user satisfaction. 30 participants were senior nursing students enrolled in a 12-week applied management course. Although differences between the two study groups for the knowledge test and group processes were not significant, group mean scores were slightly higher for the experimental group. Significant differences were found between the groups for generation of ideas. User satisfaction with the SMART Board was moderately high, reflecting a positive attitude toward the SMART Board.

Bell, Mary Anne (1998) studied teachers' perceptions regarding the use of the interactive electronic whiteboard in instruction. A 67 item survey was posted on the internet and completed by 30 participants. The questionnaire included 16 questions about demographic information and 60 Likert scale questions related to five hypotheses which predicted that teachers and students would offer favorable opinion about various aspects of its use. Responses indicated that teachers were using the board in a variety of creative ways. Features of the board repeatedly praised were interactivity, ability to

mark and save notations, size of display for presentations and ability to manipulate software from the board. Training and the lack thereof, is often cited as a reason technology is not embraced by more educators.

2.5 Inference

From the review of literature of Computer and OHP such as Hamzah and Ahmad(2016), Yadav(2012), Negin(2009), Smeets(2005), Bartch(2003), Blikzjil(2004), Lowry(1999) and Evan(1998) it is evident that over all the world computer education more precisely the ICT is used for enhancing the whole teaching learning process. As Hamzah and Ahmad(2016), Mahmood(2013), Negin(2009), Nouri and Shahid(2005), Sussikind(2005), Volman(2005), Selwyn(2000) and Robertson(1985) explored the attitude and notions of the students towards computer and OHP; Sutherland(2004), Smeets(2005), and Negin(2009) studied the role of ICT in contribution to learning. On the other hand Pachaiyappan(2016), Ndibalema(2014), Mehra(2007), Joy and Manickan(2002) and Bell(1988) studied the attitude of teachers towards computers and OHP in teaching; Ndibalema(2014), Joseph(2014), Anitha(2013), Bartch(2003) and Muir(2004) studied the utilisation of these media in educational systems.

Analysis of studies related to use of Smart boards in education revealed that this technology is in use abroad with many researches proving the fact. According to Jena(2013) and D&B(2010) smart classes show a positive impact on the academic achievement of students. There is only one study contradicting it that is of Tate(2002), according to whom there is no significant difference on the students' performance of students taught through smart boards. According to Egeby(2011), Holder(2007) and

Roennikge(2001) smart board interactive whiteboard teaching enhances independent learning among students, and is a medium for self evaluation. Mc Carthy(2012), Jacobsen(2011), Hashmei(2011), Fortuna(2007), Oleksiw(2007), Mc Neese(2003) and Tate(2002) were of the view that smart board teaching increases student engagement, motivation and excitement. Countering this study, Solvie(2001) found no significant difference on the attention of lessons among students. Teachers have positive attitudes towards the use of smart boards in teaching according to Egeby(2011), Jacobsen(2011) D&B(2010), Zhao(2006), and Fortuna(2007).

2.6 Conclusion

The review of related research reveals that a large amount of research work has been done in relation to various factors concerning the use of different educational media, no such study had been conducted that cover all three medias viz., OHP, Computer and Smartclass. A series of studies of different nature focusing on the varied aspects and dimensions of educational media is the need of the hour. The information obtained through such studies may lead to certain findings of practical utility for effective conduct of the educational media programmes. None of the study has attempted to ascertain the attitude of principals, teachers and students towards educational media and subsequently its utilization at secondary school stage. The present study under investigation focusing on these two factors will be one such attempt.
