

## Chapter II

# REVIEW OF RELATED LITERATURE

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### 2.1 INTRODUCTION

A comprehensive review of literature is essential for any research study as it forms the basis for any research work. This review of related literature works as a guiding lamp with regard to the magnitude of work done in the study. It also enables the researcher to comprehend the merits and demerits in order to avoid duplication. It develops the potential in the researcher to examine the methodology used, to organize the study and to work in a productive manner. The related literature pertaining to a problem enables the researcher become familiar with previous research work, the writings of acclaimed experts, what has been researched already, and what has not been researched, and thus provides a background of the study that is to be undertaken.

A review of related studies is essential to have an idea of what has been done previously in similar areas in order to originally contribute to the field of research under study. The thinking and creativity of scholars is developed as a result of in-depth reading of the related literature.

### 2.2 ROLE OF REVIEW OF LITERATURE

- ★ The search for the review of literature begins before the study is conducted. The role of this search for review of related studies has important functions. Some of them are listed below.
- ★ A careful study of the literature can help the researcher to identify the problem that needs to be investigated. It also helps in expounding the concepts that would form the basis of the study and in writing the operational definitions of these concepts.
- ★ A critical review of related studies often leads to in-depth knowledge into the reasons for limitations in an area of study.
- ★ It helps the investigator to avoid duplication of the past studies thus saving time, energy and cost.
- ★ It suggests suitable methods to undertake the problem under study.

## **2.3 THEORETICAL FRAMEWORK**

Effective learning demands teaching strategies that can include the variety of contexts in which teachers can teach, the variety of content that has to be learnt and the variety of learners with different learning styles, needs and problems. Strategies of instruction based on the application of scientific principles of human learning need to be used to provide reliable effective instruction to each learner. Many of today's strategies of instruction are based on theories that are centuries old. But the system of theory that most strongly influences the development of today's instructional strategies which are technology-based, is of much more recent origin.

Traditional instructional strategies must be reconsidered in the view of the increasing dominance of technology in everything, especially information and communication technology (ICT). The productive use of ICT fosters a more flexible and learner-centred environment. Advancements in ICT have led to the formation of a constructivist learning theory which is a definitely a movement away from a behaviourist learning theory. ICT developments and new research on the effectiveness of technology enhanced learning require the continuous planning of technology - enhanced learning strategies or adjustments to existing strategies (Laurillard, 2000).

The present chapter deals with the review of related research studies. An attempt has been made to Present the review of related research of use of ICT integrated teaching and Effectiveness of its use.

The literature that is concerned with the study on “Effectiveness of ICT integrated teaching in achieving learning outcomes in biological science of grade 9<sup>th</sup> students” has been reviewed under the following headings.

1. Advancements in Educational Technology
2. Studies on ICT in Education
3. Studies Related to Video-Based Instruction
4. Studies related to teaching of biology through ICT

## 2.4 STUDIES RELATED TO ADVANCEMENTS IN EDUCATIONAL TECHNOLOGY

Modern age is the age of science and technology. The contribution of science and technology has been experienced in all spheres of human life including education. The National Policy of Education 1986 has observed “Educational Technology will be employed in the spread of useful information; the training and re-training of teachers, to improve the quality, sharpen awareness of art and culture, inculcate abiding values etc., in both formal and non-formal sections”. (Singh, 2006)

**Cheung and Slavin (2013)** evaluated features of educational technology applications which could affect reading outcomes. The findings of the study suggested that applications in educational technology resulted in a positive effect in comparison to traditional methods. There were differences in the impacts of various types of educational technology applications. Innovative technology applications and integrated literacy interventions when supported by extensive professional development showed more promising evidence. The methods suggested were found to have great promise is the use of technologies in close connection with teachers’ efforts.

**Cheung and Slavin (2013)** examined the “Effects of educational technology applications on mathematics achievement in K-12 classrooms”. The findings suggested that educational technology applications generally produced a positive, though modest, effect in comparison to traditional methods. However, the effects may vary by educational technology type. Among the three types of educational technology applications, supplemental CAI had the largest effect.

**Edwards and Groves (2012)** emphasized that technology use in society has paved the modern way for producing texts in classrooms. It drew on an empirical study investigating how the pedagogy of writing as creativity and technology converge in practice to change the face of classroom learning and interactions around text production. Furthermore, training teachers to the interactive nature of techno literacy pedagogies in contemporary writing classrooms, challenges traditional notions that

information and communication are the central tenets of technology use. The research explored how five teachers from one primary school in NSW, Australia, developed understandings of changing literacy and learning practices and pedagogies through focused collaborative dialogues.

**Kori et al. (2014)** emphasized reflection which has been regarded as a process that leads to deeper learning and a more complex and integrated knowledge structure. Technology-enhanced learning environments are recognised as effective facilitators that support students' learning. Reflection support has been introduced in the context of technology-enhanced learning to bring about a positive effect.

**Marshall and Rebecca (2012)** emphasized that if smartly and strategically utilized, modern information and communication technology holds great scope to bring about quality learning to some of the world's poorest communities. Technology enthusiasts have long hailed the power of technology—from the printing press, to blackboards, to the laptop—to transform education. With the rapid expansion of information communication technologies throughout the world, there is a high level of interest in using modern technology to help improve the educational status of the world's poorest people.

**Namciti (2013)** viewed that the methods of education have changed from generation to generation. There is a direct connection between the technology available and the education practices. All of the technological advancements made in education have allowed students to access vast stores of information and because of these advancements it became easier to get by without learning, and, on the other hand, learn in a much more efficient way.

## **2.5 STUDIES RELATED TO ICT IN EDUCATION**

With the advancement in ICT, it is easier to share the information or to connect with the people across the globe. Recently, the enhancement of student teacher interaction with ICT in the classroom has been recognised. The emergence of information and communication technology (ICT) in school is invincible. ICT covers all aspects of education, leading to the

formation of new knowledge and networks of teachers, promoting the development of new methods and approaches to teaching. Various studies have seen done related to use of ICT.

### **2.5.1 Studies related to attitudes towards the use of ICT**

**Aliya Mustafa (2016)** conducted a study on “teachers attitudes towards technology integration on a Kazakhstani secondary school”. The purpose of the study was to exposure teachers attitudes towards technology integration through examining the four specific factors of self-confidence, knowledge, gender and age that may influence teachers attitudes ICT and analyse the relationship between the teachers attitudes and their students’ academic motivation. Mixed method design was adopted for the study. Major findings were that there was an interconnection between teachers attitudes and student’s motivation. The more positive attitudes towards technology were the more motivates students.

**Cavas et al., (2009)** conducted study on “A Study on Science Teachers’ Attitudes Toward Information and Communication Technologies in Education”. The purpose of this study was to reveal Turkish primary science teachers’ attitudes toward ICT in education and then explore the relationship between teachers’ attitudes and factors which are related to teachers’ personal characteristics (gender, age, computer ownership at home, and computer experience). The findings of the study revealed no significant differences between ICT attitudes of Turkish science teachers in terms of gender. The results also indicate that Turkish science teachers have positive attitudes toward ICT and although teachers’ attitudes toward ICT do not differ regarding gender, it differs regarding age, computer ownership at home and computer experience.

**Chhavi lal (2014)** studied attitudinal study of user and non-user teachers towards ICT in relation to their school teaching subjects. The main objectives of the study to compare the attitude of ICT user and non-user teachers towards ICT in relation to their school teaching Objectives. Descriptive survey method was adopted in the study. Major findings were (i) ICT user teachers’ attitude towards ICT is highly positive in comparison to ICT non-user teachers (ii) attitude of female ICT user and

non-user teachers is very much higher than the male ICT user and non-user teachers respectively (iii) computer experience plays a vital role in increasing computer use.

**Nishi Tyagi and Imrana (2017)** conducted a study titled “A study of the attitude towards information and communication technology of secondary school teachers I relation to their gender and types of School”. The study was descriptive survey design. The major findings were (i) No significant difference was found between the mean attitudes scores towards impact of IT, productivity for teachers’ interest and acceptance of male and female secondary school teachers. (ii) Significant difference was found between the mean attitudes scores towards usefulness for students of male and female secondary school teachers attitude scores by the female teachers were more.

**Taranch Enayati et al. (2012)** conducted a study on teachers attitudes towards the use of technology in education. The main objectives of the study were (i) to know the influence of technology in education (ii) to find out the benefit of the user of technology in education (iii) to find out the effectiveness of technological equipment in education. The study was a descriptive survey. Major findings were that there is a positive attitude towards the advantages of implementing technology in education m the amount of technology efficiency in education preconditions of implementing technology in education.

### **2.5.2 Studies related to integration of ICT integration**

**Anil Ambasana (2009)** conducted a study on” utilisation of computer technology in remedial instruction”. The findings concluded that computer assisted instruction programme in remediation task was found to be successful as the students were able to overcome the challenges and difficulty points in the content. They were able to increase students Achievement significantly and is very effective.

**Bahr (2009)** studied on “technological barriers to learning” found that complex environment may negatively impact the students learning. Learning is enhanced when integrating pedagogies are employed to soften high load information. The study suggested that ICT in education needs

to consider the professional capabilities of teachers to design and integrate technologies for learning.

**Blackmore et al.(2003)** studied on” effective use of information and communication technology to enhance learning for disadvantages school students”. The findings of the study suggest that using ICT in learning offers advantages and opportunities to increase student’s motivation, helps students to solve problems and increase student’s attention period.

**Desai (2004)** observed that the mean achievement of the experimental group was significantly higher than that of the control group when teaching health and hygiene through the traditional and multimedia approach, in the subject of Home science.

**Farahiza (2009)** conducted a study on “effectiveness of using internet as a principal information resource in teaching and learning activity in Higher educational institutions in Malaysia”. The study indicated that there are significant relation between the internet use and the student and also the lecturer in using the internet. The findings of the study shows that internet is a technology that can brought benefits to the students and lecturer in teaching and learning activities as well as the applications provided by the internet.

**Hancer (2008)** conducted study on “A Research on the Effects of Computer Assisted Science Teaching”. This study aims to prove the effectiveness of computer assisted teaching method over the teacher centered method (explaining, question-answer, demonstration) together with the academic achievement of science teaching students in the fields of science and technology. In this study, pre-test-final test control grouped model was used. After t-test analysis, data showed that computer assisted teaching was more effective than teacher-centered methods to increase academic achievement and to acquire permanent teaching.

**Illomaki L (2008)** conducted a study” the effects of ICT on school-teachers and the student’s perspectives” by using mixed methods of quantitative and qualitative research simultaneously. The objectives of this study are (i) to know how genders and generations differ related on ICT (ii) to know issues related to effects and consequences of implementing ICT for school and for teaching community. The findings

of this study showed conclusions for a long-time perspective has been an advantage which avoids the technology hype here. The focus has been on level keeping in mind socio-cultural and political dependencies and interaction.

**Ives E.A. (2012)** conducted a research study “I generation: the social cognitive effects of digital technology on teenagers” by the conduction of an action research including Fields study, survey, directed questions and interviews the objectives of this research is to better understand how digital consumption affects teenagers’ cognitive abilities and socialisation process. Findings of this research emphasize not only the need to embrace the numerous positive aspects of digital technology but also the utmost importance to integrate healthy digital practices in teenagers.

**Kaushik bhakta & Nabanita Dutta (2016)** conducted a study on “impact of information and technology on teaching-learning process”. The main objectives of the study were importance of information technology in educational sectors impact of information technology on classroom teaching. It was a qualitative study. The major findings were (i) information technology reduces the school dropout rate, absenteeism and at the same time improves the level of confidence (ii) widespread ignorance of teachers about the use of application and advantages of IT (iii) today teachers are not well equipped with the modern use of technology.

**Khirwadkar (1999)** conducted study on “Developing a computer software for learning Chemistry at Standard IX”. This study aims (1) To develop CAI package in subject of Chemistry for standard XI Science Students. (2) To study the effectiveness of the developed software in terms of instructional time and achievement of students. (3) To study the effect of software package on students’ achievement in relation to students’ intelligence level, motivation level, and attitude towards the package. (4) To study the attitude of the students and teachers regarding the effectiveness of the CAI package Findings: The developed software package was found to be effective in terms of academic achievement of the students. The students and teachers were found to have favourable opinion towards the software package. There was found an interaction



effect of IQ, motivation and opinion of students on their academic achievement.

**Kim Y. (2003)** conducted a study on “impact of internet on children’s daily life: physical social well-being by using measurement as a tool survey as method. The purpose of this study was to know the relationship between children’s internet use and level of physical- social activities. This study found no displacement effect on the children’s daily activities. Next generation children surrounded by media are not necessarily giving up other activities that are also important for their physical- social development.

**Kozma (2005)** have and demonstrated that ICT can help deepen students content knowledge, engage them in constructing their own learning and support the development of complex thinking skills. He reported that teachers must know how to deliver lessons, select sources, guide activities and support learning process because the ICT alone cannot create this kind of teaching and learning environment.

**Kumar (1998)** has conducted a study using experimental method to examine the relative effectiveness of three method is instruction, exposition method programmed learning. The results found that (i) the multimedia method was effective than either the programmed learning method (ii) the programmed learning method was more effective than the expository method (iii) retention in learning by the multimedia method is higher than by the other two methods.

**Muduli J.R (2012)** studied on” addiction technological gadgets and it’s impact on health and lifestyle: a study on colleges students” by using sampling method to select the study area. Objectives of the study were (i) to examine the intentions behind use of Tech devices and services (ii) to study impacts of addictive use of the tech-gadgets and services on mental health and lifestyle. Findings of the study hinted that knowledge and time management and settings the priorities of life should guide our behaviour on using the technological gadgets and services. Use of any product should be necessity driven, so that we can drive maximum pleasure and happiness.

**Mulder S (2010)** studied on” the impact of social technology on the development of social competence: a survey of adolescents” by using survey instrument and data analysis. This study was conducted to determine current social technology usage in middle school students as to identify the impact of social technology has on the development of social competence in children. This study indicated that social techniques are becoming a large part of adolescents lives and may be contributing factor which would influence the development of social competence. It is too early to identify and direct and specific long-term effect on individuals.

**Nazir Ahmed Jomezai Al.(2018)** made a study on secondary school teachers concerns about the ICT integration: perspectives from a developing part of the globe. It’s was a mixed method research design for quantitative data analysis coding data technique was used. Major findings of the study are (i) majority of the teachers are at the unconcerned, informational or personal stage about the use of ICT in their instructions (ii) teachers want to know more about the innovation (iii) Teachers need more insight about the ICT integration prior proceeding with the issue.

**Oğuz Serin (2011)** conducted study on “The Effects of The Computer-Based Instruction On The Achievement And Problem Solving Skills Of The Science And Technology Students”. This study aims to investigate the effects of the computer-based instruction on the achievements and problem-solving skills of the science and technology students. The result of the study reveals that there is a statistically significant increase in the achievements and problem-solving skills of the students in the experimental group that received the computer-based science and technology instruction.

**Rathod (2005)** established the fact that information technology based instructional package was found to be effective for teaching Environmental Education because there was a significant difference in the pre-test and post-test mean scores of the experimental group and control group.

**Sandholtz et al. (1997)** studied on “Teaching with technology, creating student- centred classrooms”. They findings reveals that there were positive changes in students’ attitude. Their interest and motivation

typically extended to the last week of school and as students became more involved in work. Students enthusiasm and interest resulted in great on task behaviour and they were highly involved in their respective assignment and frequently able to do their own work with little assistance. **Thillaka and Pramilla (2000)** conducted study on “Use of Computer Multimedia Programme in Learning Trigonometry among High School Students”. The purpose of this study was (1) To find out the influence of computer-based multimedia programme on achievement in mathematics among high school students; (2) to find out the difference in achievement in mathematics between high achievers and low achievers from both relative retention of learning in mathematics. Findings: (1) There is no influence of computer-based multimedia programme on the achievement in Mathematics among high school students. (2) There is no significant change in their attitude towards mathematics after learning Trigonometry through computer-based Multimedia and text-based self-study material. (3) There is no significant difference in achievement of mathematics between high achievers and low achievers for both experimental and control groups. (4) There is no significant difference in the retention of learning in mathematics between the experimental group and control group. Three references were cited in the study.

**Ul-Amin (2013)** studied on” ICT as a change agent for education” by using literature review regarding the use of ICT in education. Objectives of this study was to know the effective use of ICT for education along with ICT use in teaching learning processes, quality and accessibility of education learning motivational and learning environment were focused. The findings of this review set out to identify and evaluate relevant strategies in rational and international research and initiatives related to measuring and demonstrating the effective use of ICT for education with regard to teaching learning process, learning environment and enhances the learning performances.

**Wajszczyk R.(2014)** conducted research a “ study of the impact of technology in early education” by using quantitative methods such as in depth survey and interviews. The main objectives of this study was to identify the major impacts regarding the ICT environment from primary

school staff perspective where ultimately the new knowledge can form an informal basis for future research in early childhood education. The findings indicated that the impact of ICT students is positive in most cases. However, it is important that the introduction of ICT into curriculum shall be carried out reasonably and with modernization.

**Zyoud, (1999)** conducted study on “Development of Computer Assisted English Language Teaching for VIII Standard Students”. This study aims (1) To develop a computer assisted English Language Teaching Programme for Standard VIII Gujarati medium students. (2) To Study the effectiveness of the Computer Assisted English Language Teaching Programme on student achievement in terms of vocabulary, grammar and comprehension by taking pretest scores and IQ as covariates. (3) To study the effectiveness of the Computer Assisted English Language Teaching Programme on the experimental group students’ achievement in vocabulary, grammar and comprehension with respect to their intelligence, motivation and attitude. (4) To study the attitude of the students towards the usefulness of the computer assisted English Language Teaching Programme. Findings: The study reveals that when the computer is used to its full potential, it can help the students achieve more in learning vocabulary, grammar and comprehension to the learners with different IQ, motivation and attitude. It helps the students learn better because it provides them with a lot of freedom and responsibility to learn at their own pace. The students were found to have +ve attitude towards Computer Assisted English Language instruction

## **2.6 STUDIES RELATED TO VIDEO-BASED INSTRUCTION**

**Araselvi (1996)** conducted a study to measure the effectiveness of educational audio and video cassettes in teaching mathematics at secondary level. She found that both the strategies i.e., audio instruction and video instruction were more effective than the traditional lecture method. The video instruction was more effective than audio instruction in teaching mathematics to the students of class VIII.

**Dange and Wahab (2006)** studied the “Effectiveness of Computer Assisted Instruction on the Academic Achievement of IX Standard Students in Physical Science.” Their findings showed that there was no significant difference between mean gains scores of experimental and control groups of pre-test. There was no significant difference between mean gain scores of pre-test and post-test of control group and experimental group. There was no significant difference between mean gain scores of post-test of control and experimental groups.

**Indubala and Singh (1999)** conducted a developmental cum experimental study on Environmental Education through video-instructional package. The results of the study indicated that teacher made video-instructional packages can be used effectively for creating awareness on environmental issues than the conventional method. This was evident from the higher post-test scores.

**Janakavalli (1996)** in her study on the “Impact of Multi-Media Approach in Teaching Environmental Education at the Secondary Level” concluded that the new concerns for the individual learner and the new ways of presenting information, using the appropriate media, especially multi-media would certainly help the teachers to create a conducive class room situation and an effective design for instruction.

**Kannan and Husain (2008)** conducted “A Study on Effectiveness of Use of Computer Technology in Teaching the Concepts of Physics at Senior Secondary Level”. The analysis of data demonstrated the fact that computer assisted teaching was the best method to teach the concepts of physics at senior secondary level. There was not much profitable learning by the students of physics who learnt without the aid of the teacher or by the traditional method of teaching physics.

**Meera (2000)** studied the relative effectiveness among different modes of computer assisted instruction in relation to students’ personality traits in realizing the instructional objectives in teaching biology at higher secondary stage. The study revealed the fact that Computer Assisted Instruction was found to be more effective than traditional lecture method. It was concluded that Computer Assisted instruction in drill and practice

mode was more effective when compared to that of tutorial and simulation modes.

**Natarajan (1996)** studied on effectiveness of modular approach in learning English by higher secondary students. The students of standard XII formed the sample for the study. It was found that modular approach significantly improved the achievement of students after modular treatment. Gender had not influenced the performance of students taught through modular approach. The boys and girls taught through modular approach significantly showed better performance than the boys and girls taught through traditional lecture method.

**Neera (1996)** compared video aided instruction and conventional teaching. It was found that the pupils scored higher in the post-test when instructed through video aided instruction. Pupils who were taught through conventional teaching scored less in the post-test.

**Nishino and Koki (1994)** undertook an exploratory investigation to determine the effects of a multimedia computer-based science learning environment and gender differences, on achievement and attitudes and interests of students in an eighth-grade science classroom. The students in the experimental classroom had a significantly higher post-test mean score in 'self-concept' than the students in the traditional science classroom.

**Rajaguru (1999)** reported that multi-media instruction facilitated the learning-disabled children to learn science concepts better than their counter parts in the conventional teaching group.

**Ramesh (1998)** studied individualized instruction as an alternative strategy in development of cognitive skills in atomic physics among the students of X. The results showed that the groups instructed through programmed instruction and Computer Assisted Instruction showed significant improvement in cognitive skills than the group that was instructed through conventional teaching.

**Varghese (2001)** in his study on finding the effectiveness of Computer Assisted Instruction in teaching simple tense to Standard VIII, found that Computer Assisted Instruction was found to be significantly useful in teaching as well as learning English grammar.

**Vasanthamani (1996)** studied the “Effectiveness of Multi-Media Approach in Teaching Physics at the Secondary Level.” The pre-test achievement score was not significant for the pupils of urban and rural locale but there was significant difference in the post-test scores of boys and girls.

## **2.7 STUDIES RELATED TO TEACHING OF BIOLOGY THROUGH ICT**

**Jeyanthidevi (2009)** observed “The Effects of Computer Assisted Instruction and Cooperative Learning in Biology for Ninth Standard Students.” She found that CAI method of teaching biology was more effective. The scores of the experimental group were significantly higher than that of the control group. There was significant difference between the variables such as boys and girls, rural and urban area students with regard to the post-test scores.

**Parasakthi (2007)** studied on the preparation and validation of a learning module on cancer biology unit in XI standard syllabus and proved that learning modules can be developed on Cancer Biology Unit which can increase the learning outcomes for XI Standard Students. She found that learning modules were effective supplementary aids to students’ learning.

**Ponraj and Nellaiyapen (2008)** conducted a study on CAI in Teaching zoology and found that experimental method of teaching was more effective than the traditional method of teaching the topic ‘Nucleus’ in zoology. In other words, teaching the topic ‘Nucleus’ in zoology by using CAI was more effective. There was no significant difference between the control group and experimental group in the pre-test. But in the post-test the experimental group performed better than the control group. From the findings it was clear that there was significant difference between the variables such as boys and girls and students of rural and urban areas. There was no significant difference between the achievement scores of students who stayed in hostel and day scholars, with regard to teaching the topic Nucleus in zoology using CAI.

**Priyadarshini (2011)** studied on the “Effectiveness of Computer Assisted Instruction in imparting population awareness among B.Ed students.” She

found that CAI had produced significant higher achievement scores when compared to the conventional method.

**Sujatha and Gowri (2008)** analyzed the “Effectiveness of Modular Packages in Teaching Biology.” They found that the learning module on genetics for IX standard students had produced a significant higher mean achievement. So, it showed the effectiveness of modular package in learning genetics.

**Yusuf (2010)** conducted study on “Effects Of Computer Assisted Instruction (Cai) On Secondary School Students’ performance In Biology”. This study investigated the effects of computer assisted instruction (CAI) on secondary school students’ performance in biology. Also, the influence of gender on the performance of students exposed to CAI in individualised or cooperative learning settings package was examined. This indicated that the performance of students exposed to CAI either individually or cooperatively were better than their counterparts exposed to the conventional classroom instruction. However, no significant difference existed in the performance of male and female students exposed to CAI in either individual or cooperative settings. Based on the research findings recommendations were made on the need to develop relevant CAI packages for teaching biology in Nigerian secondary schools.

## **2.8 CONCLUSION**

Many researchers have conducted studied on teachers view on the use of ICT in classroom and effectiveness of ICT integrated teaching in learning outcomes between 1997 to 2016 in India and around the world. To the researcher’s knowledge there are limited number of studies focused on effectiveness of ICT integrated teaching in developing learning outcomes in biological science in Deogarh district of Odisha. So, the investigator decided to undertake the study. The review of literature helped the investigator in strengthening the background of the study. It provided new insights into the problem of environmental degradation. This inclusive review of related literature is followed by the methodology of the study in Chapter III.