CHAPTER - II

REVIEW OF LITERATURE

CHAPTER - II

REVIEW OF LITERATURE

2.0.0 INTRODUCTION

For today's and tomorrow's knowledge explosion society, to bring effectiveness in communication & dissemination of information, technology plays a vital role at all levels of the learning system. E-content here constitutes one of the major forms. With a combination of text, audio, video, images, animations, visual effects; information can be delivered via satellite, telecommunicative or other mediums. E-content thus forms a powerful tool of education in this contemporary education system; it is the newest method of instruction that can be used to create an information rich society where everyone, irrespective of boundaries and biases: social, physical, psychological, economic etc., are empowered to create, receive, share, interact and utilize information for their economic, social, cultural and political development. In the process of e-learning, blended learning, coaching, remote learning, training, skill development sessions; structured and validated e-content serves as an effective virtual teacher which assists in learning and knowledge acquisition and retrieval in a virtual learning environment.

2.1.0 IMPORTANCE OF REVIEW OF LITERATURE

Review here links the study with its background knowledge, signifying the area where it fits in the world of knowledge reposition and retrieval. The review elaborates about similar research happening over the past and identifies the gaps, consistencies and inconsistencies that have been found and studied upon. This also contextualizes the topic from a local, national and international perspective.

2.2.0 REVIEW OF LITERATURE

The nature of science learning is to teach students to be involved in the investigation. Investigations in science can help improve the attitudes and skills of students. Investigations in science are not only limited to scientific activities but also develop in practical activities and during the real world engagement. At present students are expected to be individuals who question, wonder reasons, and research, recognize conflicts and contradictions, make good observations and make correct conclusions from these observations, think scientifically, criticize, produce, be aware of ways to achieve knowledge, be creative, make decisions, be responsible, express themselves, not memorize information, but realize ways to reach, use, share, and produce knowledge, and have scientific processes and critical thinking skills. Over the years, science education educators and researchers have been interested in understanding the relationship between students' attitude toward science and their achievement in learning science (e.g., Abu-Hilal et al., 2014; Darmawan, 2020). One of the purposes of science education is to develop a positive attitude toward science and to enhance the interest of young people in pursuing scientific careers (Tai et al., 2006; Azizoglu and Çetin, 2009). In recent years, the decline of students' favorable attitude toward science and the falling number of students choosing to pursue the study of science have become a matter of considerable societal concern and debate in some regions across the world (e.g., Kennedy et al., 2014; Potvin and Hasni, 2014; Cheng and Wan, 2016). For the economic development of

a society, lack of positive attitude toward science and the low interest among the young to pursue science careers pose serious threats to economic prosperity (Osborne et al., 2003; Kennedy et al., 2016). Therefore, it is necessary to understand how the attitude toward science and achievement in learning science are related among young learners, such that we may develop a better understanding about how this relationship may affect students' choice of subject areas for learning and their engagement for better learning. Science learning through e-contents is an essential process in today's educational system. e-learning is required to be one of the basic tools for improving access to instruction and at last supporting social incorporation (Kaur et al., 2020). Context and resources are important dimensions for eLearning programs. The entire educational endeavor greatly depends on the way in which content is presented, a condition for efficient perceptive-visual learning (Istrate, 2009). E-content is a result of the e-learning procedure and development of e-content isn't a simple procedure. It must be set up as per student's learning levels and learning styles. Tekin& Polat (2016), stated that experts including coordinators, education psychologists, art directors, designers, environment compilers, content experts, educational sociologist, education technologists, team leaders, producers, scale and assessment specialists ought to be engaged with the creation of e-content. Elaborating the importance of e-contents, Hamdi (2016) stated that individuals can gain more profoundly from words and pictures than from words alone. For a long time, words have been the significant configuration for guidance; including verbally expressed and printed words. As pictorial types of guidance are getting broadly accessible, but essentially adding images to words doesn't guarantee enhancement in learning, i.e. not all sight and sound introductions are equally effective. In his studies (Azhari 2015) cited the impact of gender on e-learning discernment was likewise referenced in an investigation by (Samir 2009), where it indicated that the female students seem to be more skillful in using technology and social networks than male students. In another case, this

result is contradicted. as studies (Yacob. 2006) (Brooks, 2011), indicated that there is no sex distinction in the attention to e-learning execution. Since e-adapting absolutely relies upon the language as a signal for correspondence not on the physical appearance. Numerous examinations have indicated that powerful utilization of e-learning could help learners to increase their achievement, learning. commitment and participation. One of the essential elements for understudies' achievement in the e-learning process is self-inspiration and self-motivation. Because, the learner is not in direct contact with the instructor. So lack of self-motivation of learners would lead to the less benefits of e-learning. Teachers need to know their learners' motivations when teaching online classes. However, it can be difficult to assess student motivations for online learning due to the lack of personal contact between students and their instructor (Abou El-Seoud. 2014).Two factors are important to the learning process: one is the learning style; the other is the applied technology. Styles can vary but the educational goal is always the same. Some students prefer the visual style" like diagrams and pictures whereas some others prefer "The Aural Style" like sounds and music. As the coronavirus (COVID-19) pandemic closes schools and induces blending traditional learning with digital tools across the nation. education systems are scrambling to meet the needs of all learners. Findings from a study by (Engzell. 2021) implies that students made little or no progress while learning from home and suggest losses even larger in countries with weaker infrastructure or longer school closures.

2.3.0 CONSTRUCTION OF E-CONTENTS

Conventional method of teaching does not significantly help the students in easy understanding. retaining and uniform pace of learning. Learning is best facilitated by adopting the right type of methods and technology, including ICT using individually developed econtents for specific purposes (Rekha. 2013). Rekha, 2013 clearly indicated that the development of econtent in teaching DNA replication in Botany for higher secondary students was

effective. The effectiveness was found in terms of post-test of the students of the experimental group taught through e-content. She elaborated on a presumption that similar effects could be seen in other topics and other science subjects by the application of e-learning techniques. Similarly, study results from (Harahap, 2019) concluded that blended learning strategy was found significantly more effective in enhancing students' learning achievement and science process skills in plant tissue culture course as compared to the conventional learning strategy. (Amutha, 2016) stated that E-content development with the integration of multimedia components such as text, audio, video, animation and image which will give multi-sensory experience to the learners encourages critical and active learning. (Nachimuthu, 2018) Emphasized that content generation levels are four quadrants viz., e-Tutorial, e-Content, Web resources, and self-assessment. He concluded that the application of e-Content in teaching-learning in Botany at a higher secondary level process had a significant impact.

2.3.0 CONSIDERATIONS FOR ATTITUDE TOWARD SCIENCE

"Attitude could be considered as people's global evaluations of any object, such as oneself, other people, possessions, issues, abstract concepts, and so forth" (Petty et al., 2003). In the area of research for studying attitude, the biggest stumbling block is often the lack of clarity about the concept under investigation. Klopfer (1971) made a notable contribution by proposing six dimensions regarding affective behaviors in science, namely, attitude toward scientists, scientific enquiry, science learning, science-related activities, science careers, and the adoption of "scientific attitudes." More clarity gradually emerged across studies, as the studies became clearer in what components or measures were used for attitudes toward science (Schibeci, 1983; Breakwell and Beardsell, 1992; Woolnough, 1994; Koballa, 1995). According to Osborne et al. (2003), attitude toward science can be defined as "feelings, beliefs and values held about the enterprise of school science, and the impact of the science on society." Reid (2006), on the other hand,

holds that attitude can be divided into three components: cognitive, affective, and behavioral. In addition, Potvin and Hasni (2014) argue that attitude contains a wide range of sub constructs, such as enjoyment, motivation, self-efficacy, and career aspirations. Thus, it is obvious that the conceptual frameworks of attitude are diverse. Savelsbergh et al. (2016) fine grained framework of attitude constructs and grouped different operationalization of attitude toward science across the studies into four categories: interest, self-efficacy, societal relevance of attitude toward science and mixed attitude. The societal relevance of attitude toward science is represented as the perceptions and judgment about the value, usefulness, social implications of science (e.g Dowey, 2013). Students' attitudes toward science refers specifically to students' emotional conception of science – beliefs, values and feelings – and is a complex, multi-faceted construct (Osborne, Simon, & Collins, 2003). Not all facets are directly related to student attitudes toward school science, or to attitudes that relate to students' decisions regarding future coursework. In their review, Osborne et al. (2003) identified several constructs that are determinants of student attitudes influencing science-choice behaviors, including (a) student motivation, (b) student self-concept, (c) peer attitudes, (d) classroom environment, (e) perception of school science, and (f) the difficulty of science. Other factors, including gender, socioeconomic status, parental attitudes, curriculum, and cultural attitudes, were less conclusive in their roles as science attitude determinants.

2.4.0 CONSIDERATIONS OF ACHIEVEMENT TOWARDS SCIENCE

E-content significantly enhances the knowledge attainment and change in the attitude of undergraduate students on sustainable development (Awasya, G. S. 2019). Finding of a study (Prabakaran B, et. al., 2020) was that students gained enhanced mathematical achievement and retention ability through an interactive e-content module of learning when compared with a conventional method of teaching. Another major finding (Prabakaran B, et.

al., 2021) explored was that e-content module of learning positively influenced student achievement in mathematics when compared with the chalk and talk method of teaching. Similarly studies (Lapawi N, et. al., 2020; Cohen, 2020) have indicated that the effectiveness of the Science Module mediated e-documents are an effective step toward enhancing achievement in science and thus should be applied in Science, Technology, Engineering, and Mathematics teaching and learning to solve complex problems.

2.5.0 RELATIONSHIP BETWEEN ATTITUDE TOWARD SCIENCE AND ACHIEVEMENT IN LEARNING SCIENCE

Over the past decades, students' attitude-achievement relationships have been extensively studied (Willson, 1983) (Nasr, 2011), still there continues to be inconsistent findings. On the one hand, many studies showed that students' attitude toward science and their science achievement correlated positively and moderately (Nolen, 2003; Mungin, 2012; Hacieminoglu, 2016; Chi et al., 2017; Wang and Liou, 2017; Zheng et al., 2019). For instance, based on the data from Program for International Student Assessment (Pisa et al., 2017), the study conducted by Chi et al. (2017) pointed out that students' interest, enjoyment, and the perceptions of general value in science were positively correlated with scientific competencies. Similarly, in another study with 537,170 15-year-old students, Zheng et al. (2019) stated that students' interest in science was positively associated with their science achievement. Meanwhile, based on the Chinese sample of Trends in International Mathematics and Science Study (Martin et al., 2012), Wang and Liou (2017) revealed that students' perception about the intrinsic value and utility value of science had a significant positive effect on their science learning performance. Furthermore, some research studies showed a strong relationship between attitude and achievement (Mattern and Schau, 2002; Else-Quest et al., 2013; Oluwatelure, 2015). For example, in the study by Oluwatelure (2015), a significant and strong positive correlation between

science attitude and science achievement (r = 0.612) was shown. Likewise, Rennie and Punch (1991) documented that students' beliefs in their performance was closely related to science achievement (r = 0.66). On the other hand, however, there were other studies showing that the relationship between students' attitude toward science and their science achievement was either quite weak, statistically non-significant, or even negative (Rennie and Punch, 1991; Gardner, 1995; Brooks, 2011). For example, Brooks (2011) revealed that the enjoyment of science lessons, leisure interest in science activities, social implications and career in science of students were negatively associated with their science achievement. Moreover, there were also some studies that yielded contradictory results (Napier and Riley, 1985; Diggs, 1997; Salmi et al., 2016). For instance, based on a sample of sixth grade students from Finland, Estonia, Latvia and Belgium, Salmi et al. (2016) reported that the correlation between students' societal attitude (value of science in society) and performance was positive (r = 0.11), but the relationship between students' engineering attitude (interest in computer design) and performance was negative (r = −0.11).

2.6.0 SUMMARY OF REVIEW OF LITERATURE

Preference of the learner to learn a concept is related to the readiness or willingness of the learner to participate in collaborative learning. Essentially science lessons are products, processes, attitudes and technology. Attitude is an important component that must be possessed by students in biological science subjects. Attitudes toward science are considered important because they can affect the performance of students and can improve learning achievements and academic achievements too. The importance of attitudes in biological science learning can be seen in the actions of students who show positive attitudes and negative attitudes. A positive attitude indicates that students tend to be more diligent in learning so that they get satisfying results, whereas a negative attitude is characterized by students being less diligent in learning so that they get unsatisfactory results. Similarly

achievements reflect the knowledge acquisition of learners, higher scores mean better content delivery. The decline of education in parallel with the COVID-19 pandemic is now at the center of conversation. Technology, challenges and mental stress are key concepts linked to the subject under discussion.

2.7.0 RESEARCH GAP

High-quality after-school programs devoted to science have the potential to enhance students' science knowledge and attitudes, which may impact their scientific decision making, problem identification, mitigation and adaptation. Due to the unique nature of these informal learning environments, an understanding of the relationships among aspects of students' content knowledge acquisition through e-contents could be reflected in academic achievements in and attitudes toward science which could further aid in the development of effective biological science related interventions.

2.8.0 RATIONALE OF THE STUDY/JUSTIFICATION OF THE STUDY

Understanding, mitigation and adaptation of changing needs of daily survival necessitates the gathering, archival and application of tentative meaningful information from the science of living; ensuring its full utilization we have structured an information and meaning making system. We have diversified the branches of useful sciences into physical, social, value, ethical and life sciences; though these diversifications are evolving and limited, the effective analysis of the whole would not fit in the time frame of two year degree; thus science education was chosen to be assessed according to three point attitude and multiple choice achievement test taking into account the learning learners were receiving during the period of experimental situation observation, intervention and evaluation. Maximum effort was given to prevent biases.