

**EFFECT OF INTEGRATED MULTIMEDIA IN TEACHING
SCIENCE FOR HIGH SCHOOL STUDENTS**

B. DURGA SHREE

21PED002

A THESIS SUBMITTED TO

**AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION
FOR WOMEN, COIMBATORE - 641043**

In Partial Fulfillment of the Requirement for the Degree of

MASTER OF EDUCATION

MAY 2023

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Under Guidance of

Mrs. T. PREMALATHA

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CERTIFIED AS BONAFIED RESEARCH WORK

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Signature of the Supervisor

DECLARATION

I. B. Durga Shree, hereby declare that the thesis entitled "**Effect of Integrated Multimedia in Teaching Science for High School Students**" submitted to Avinashilingam Institute for Home Science and a Higher Education for Women, Coimbatore, in partial fulfillment of the requirements for the award of the Degree of **Master of Education**, is a record of original and independent research work done by me during the period under the supervision and guidance of **Mrs. T. Premalatha**, Assistant Professor, Department of Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, and it has not formed the basis for the award of any Degree/ Diploma/ Associateship/ Fellowship or other similar title to any candidate of this or any other University.

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Signature of the Supervisor

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INTRODUCTION

CHAPTER 1
INTRODUCTION

“If a child can’t learn the way we teach, maybe we should teach the way they learn”

~ Ignacio Estrada

1.1 INTRODUCTION

Over the course of the past decade, there has been a sea change in the way that computers are utilized in instructional settings. The notion of integrated multimedia teaching and learning, which is dependent on technology to provide educational information to the student in a good and effective manner, has arisen throughout the course of time, beginning with the use of computers in educational settings and advancing to the utilization of the Internet in educational settings. However, the majority of parents, students, and teachers are in agreement that the best way to prepare students to adapt to a changing world is to teach them the fundamentals of computer science and use. There is disagreement among educators as to the kind and extent of curriculum changes that are necessary to keep up with the age of computers and information technology; however, there is consensus that preparing the next generation by teaching them the fundamentals of computer science and use is the best way to prepare them for the changing world.

1.2 GENESIS OF THE PROBLEM

A person's behavior may be changed throughout the course of their whole life via a process called education, which is an ongoing process. Any effort to educate people ought to have the overarching goal of altering people and society as a whole. Because of this, many people believe that education is the single most essential factor in determining a person's level of development. It takes into account a wide range of factors, including things like culture, socioeconomic standing, geographical conditions, and the social, political, theological, and spiritual characteristics of the situation. If a person has experience from each of these different sources, then they are said to have a well-rounded education. As a result, education may take place either via experience or by engagement with one's surroundings, and this can eventually result in a shift in how individuals conduct themselves. Education has a significant role in determining a

person's capacity to modify their behavior in response to the specific requirements of a given situation. As a consequence of this, it is essential to the process of reforming society. The new and emerging trends in society will decide what a child should learn, how they should learn it, and who will be responsible for implementing these changes. These challenges may be conquered via education and the establishment of educational institutions in order to transmit changes since they are a reflection of the demands of society. Teachers have the ability to use these enhancements in their classrooms to achieve high-quality education. According to the National Policy on Education (1986), which stated that "the status of the teachers reflects the social cultural ethos of a society it is said that no people can raise above the level of its teacher," the efficacy of an educational system is largely dependent on the qualifications of its teaching staff. Teachers get support and guidance from the educational institution that they attend. Therefore, educational institutions that prepare teachers are required to incorporate contemporary pedagogical methods into their curricula.

1.2.1 Developing new trends in teacher education

The majority of the younger generation's knowledge is often conveyed through their instructors. It is necessary to develop a group of teachers and teacher education programs that make use of current technology in the classroom in order to meet the demands and expectations of students in the 21st century. This will allow schools to better meet the needs of their pupils. In order to meet the educational requirements of the kids, we must have teachers who are knowledgeable in the art of information transmission, have a genuine concern for their pupils, and work hard to ensure their future success. Teachers should be prepared to put into practice the use of appropriate teaching techniques, adequate material knowledge, and specialized abilities in a technologically sophisticated context. These are all things that may be taught via constant and in-depth training. This will result in an increase in the caliber of education by enhancing the overall quality of both instruction and learning. Because of this, there is a rising amount of pressure being put on educational systems all over the globe to make use of modern information and communication technologies in order to educate students and assist them in acquiring the knowledge and skills they will need in the twenty-first century. According to the UNESCO World Education Report (1998), titled "Teachers and Teaching in a Changing World," the teaching profession is evolving as a direct result of the introduction of new technologies, shifting away from lecture-based instruction that focuses on the instructor and toward student-centered, interactive

learning environments. It is a truth universally understood that in order for educational reform to be effective, it is necessary to first devise and then put into practice educational programs that make use of information and communication technology. On the other hand, a teacher is something that cannot be replicated by any of today's more advanced technology equipment. Learning chances may be enhanced by using technological gadgets in addition to the instruction provided by the instructor. A teacher in a school that does not make extensive use of technology may even be able to convey information more effectively than in a classroom that does.

1.2.2 Conventional teaching

Conventional teaching is by far the most common method of education used in classrooms today. This method places an emphasis on the role of the instructor as the chief administrator of the classroom setting. Since the teacher is the one who makes decisions and is in charge, it follows that they are the ones with the authority and the responsibility. In more conventional forms of education, instructors saw their roles in the classroom as those of knowledge communicators with the students. Traditional classroom settings are used in conjunction with a wide range of instructional strategies to facilitate learning. The four most common types of instructional approaches, namely the lecture method, the lecture demonstration method, the project method, and the assignment method, are referred to as the conventional teaching strategies. In each of these methods, the teacher acts as a guide for the students and instructs them on how to complete various activities. When students are taught via lectures, they are less interested in the material and more passive. In the approach known as lecture-demonstration, the instructor will continue to provide an explanation of the experimental component as the students observe the demonstration. This technique, in contrast to the lecture style, incorporates a learning process that goes in both directions. When learning is accomplished through the use of projects and assignments, the role of the instructor is critical to the success of both. As a direct consequence of this, the conventional approach to education is focused on the role of the teacher. It is not considered to be a method that focuses on the learner. The conventional teaching techniques do not include any kind of active student engagement or student interaction. Therefore, in order to foster interactive learning, educators make use of e-learning, a strategy that is centered on the student and encourages active learning.

1.3 MULTIMEDIA

The term "integration of multimedia teaching" refers to a novel teaching method that combines multimedia, information resources, and information methods with content and teaching process in the teaching process with the guidance of contemporary educational ideas and organically unifies them on a spatial and temporal platform, so as to more effectively accomplish the teaching tasks. This mode of instruction was developed by combining multimedia, information methods, and information resources with content and teaching process in the teaching process with the guidance of contemporary educational ideas.

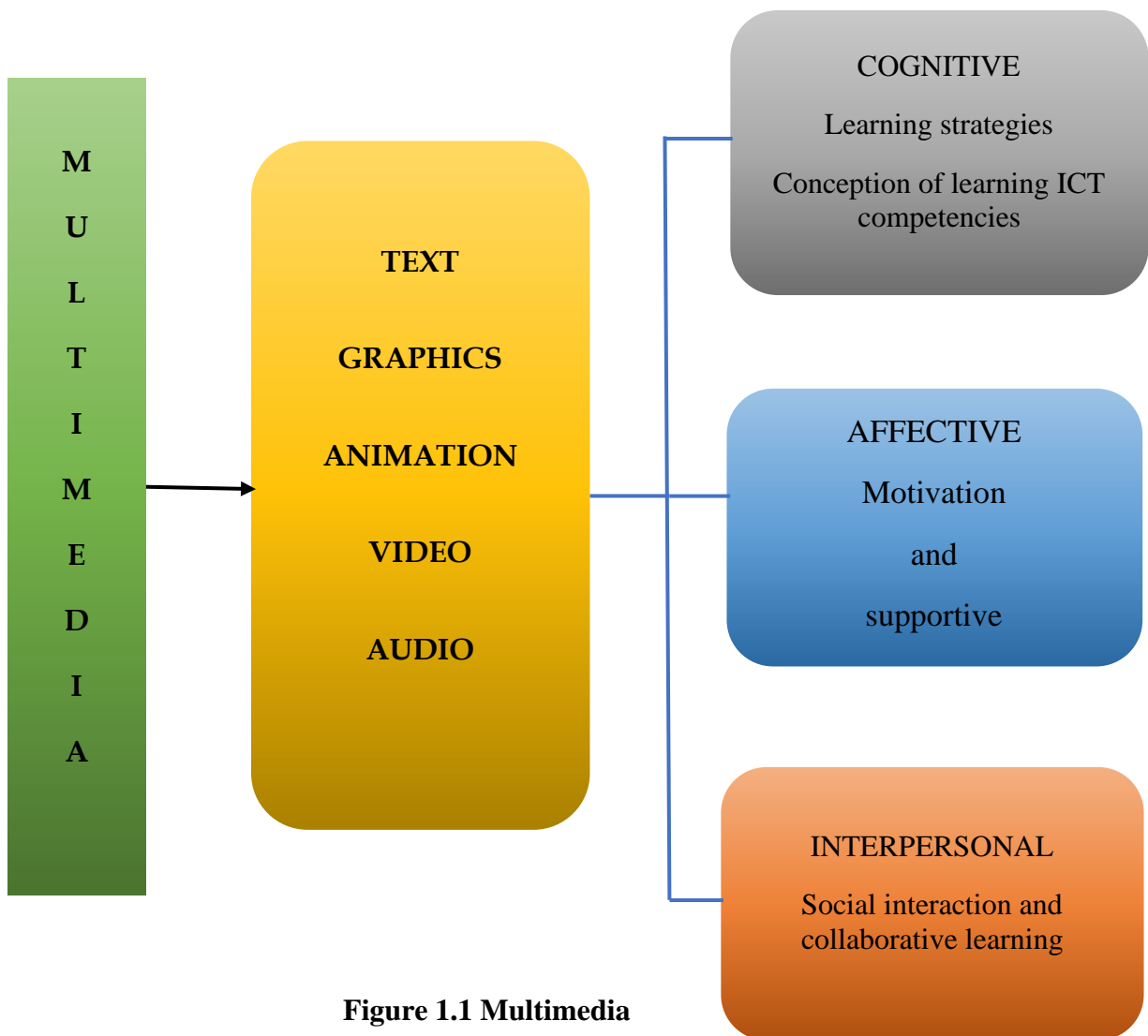


Figure 1.1 Multimedia

Bob Goldstein is credited with having first using the word "multimedia" in 1966. In the late 1970s, presentations that consisted of multi-projector slide displays timed to an audio track were described using this word. According to Tay Vaughan, who wrote the first version of McGraw-Hill's *Multimedia: Making it Work* in 1993, "Multimedia is any combination of text, graphic art, sound, animation, and video that is delivered by computer" (Vaughan, 1993). This was stated in the first edition of the book. In popular parlance, the term "multimedia" refers to a mix of media that is provided electronically and may be viewed in an interactive manner. This combination of material can include video, still photos, audio, and text. The period in which we now find ourselves is known as the age of computers and communications. The development of computers in the early 19th century made it possible for us to advance human knowledge and disseminate it all across the world. Everyone lives in something like a global village, in which every person in every nation is able to interact and trade with every other person in every other nation, regardless of how far away they are. During the early phases of computer development, it was regarded of as a device that could calculate difficult mathematical expressions at a very fast speed and that could run a programme consisting of such expressions or statements. Today, however, computers are capable of much more than that. In the beginning, all computer-based interactions were restricted to the exchange of textual information, which could only take the form of raw data, text files, etc. In modern times, the circumstances have undergone a dramatic shift (Pakhira, 2010). It is simple to communicate with one another and share information in the form of text, music, or visuals. The monomedia to multimedia transition in computer communications is something that has recently taken place. Only one-way communication may be achieved with the use of bare communication capabilities such as broadcasting and tele-broadcasting. However, because to advancements in multimedia technology, interactive conversations in both directions are now feasible. The incorporation of multimedia software into numerous aspects of human endeavour has had a significant impact on the ways in which we live our lives and the routines we follow. According to Kumar (2004), the incorporation of visuals, real-time simulation of naturally occurring events, animation, and virtual reality transports everyone to a new world characterised by an explosion of information.

The integrated services offered by various forms of digital media, such as text, graphics, audio, and video, together with their respective interaction methods are referred to as multimedia, which is a widespread word used in the industry. A multimedia system is a mix of multiple media

components that uses a variety of different hardware and software components. The implementation of the well-known broadband network known as ISDN (Integrated Services Digital Network) marked the beginning of the correct use of multimedia service providers. According to Suma (2016), a literal definition of it would be a facility for providing services that incorporates a variety of various media components. The following elements make up a multimedia presentation.

- i. Copper or fibre cables as communication medium.
- ii. The role of radio and optical waves as carriers of information.
- iii. Information in text, audio or video (still or movie).
- iv. Displays that are either stationary or movable, such as personal computers, televisions, mobile phones, laptops, etc.
- v. A word, a picture, a graphic symbol, a video CD, a synthesiser, a still camera, or a video camera, among other things, might be a source of information.

1.3.1 Components That Make Up Multimedia

The term "multimedia" refers to the integration of multiple media elements (such as audio, video, graphics, text, animation, etc.) into a single synergistic and symbiotic whole that results in more benefits for the end user than any one of the media elements can provide individually (Reddi, 2003). The fundamental components of multimedia are illustrated as follows: audio, video, graphics, text, animation, etc.



Figure 1.2: The components that make up a multimedia presentation

The following are the five primary components of multimedia:

1.3.1.1 Text

The most fundamental component of multimedia is text. It entails the use of various font kinds, sizes, colours, and backgrounds for the text. Hypertext refers to the process by which one piece of media may connect to another piece of media or screen inside an application that uses multiple media. There are three aspects that need to be taken into consideration before one can create a multimedia presentation that is successful. They include the location of the text on the screen, how long the message is, and how easily it can be read.

1.3.1.2 Graphic

The multimedia programme seems more appealing thanks to the graphics. It is beneficial to demonstrate concepts via the use of still photos. Bitmaps, also known as painted graphics, and vectors, often known as drawn graphics, are the two primary forms of visuals that are used.

1.3.1.3 Audio

An application designed for multimedia may involve the usage of music, voice, and other sound effects. Audio is another name for it, while the sound element is another. There are two primary categories of sound or audio, and these are analogue audio and digital audio.

1.3.1.4 Video

Video offers a significant effect in a multimedia programme. The following are some of the reasons why digital video is becoming more popular in the realm of multimedia applications:

1. Editing video clips is not a difficult process.
2. The digital video files can be saved on the computer just like any other file, and the quality of the video may be preserved while doing so.
3. The video files may be transmitted inside a computer network, which makes it possible to do non-linear editing on any segment of the movie. However, the size of these digital video files is rather substantial. The process of transferring these data may be quite time-consuming, particularly when done over the internet.

1.3.1.5 Animation

The art of giving the impression of movement to a still picture is referred to as animation. The use of digital animation is common in multimedia presentations. Two-dimensional (2D) and three-dimensional (3D) animations are both possible in the realm of digital animation.

1.3.2 Different Varieties of Multimedia

The majority of the multimedia programming fall into one of two categories:

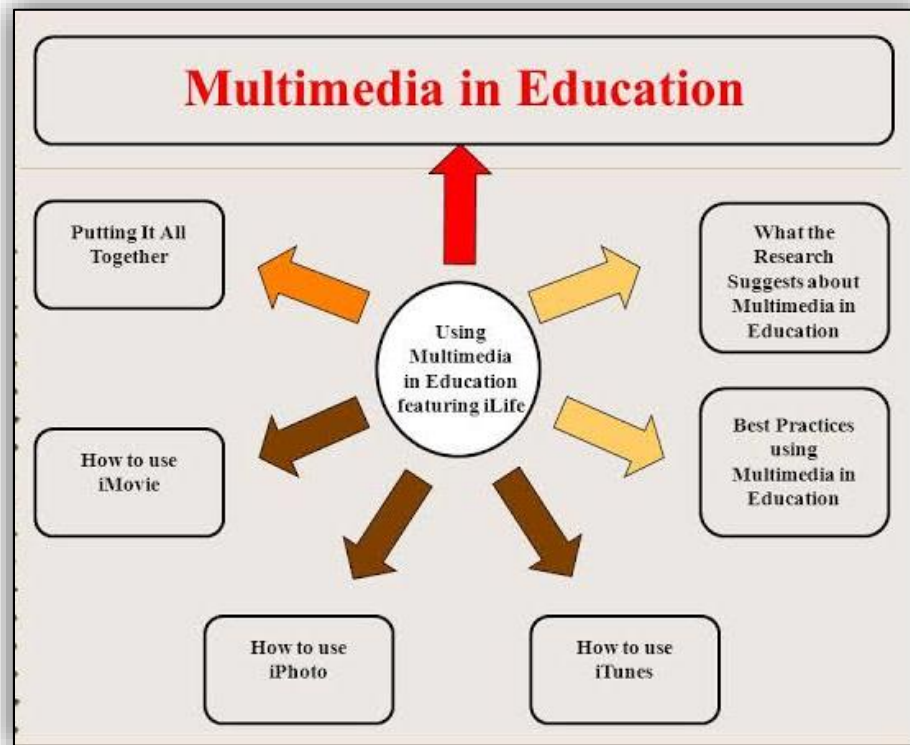
a) Linear - The nature of the first forms of multimedia was linear. In linear multimedia, the end user gets programming that plays a series of sound, video, and graphics without providing them with any means to control the content of the presentation.

b) Non-Linear - In contrast to linear, non-linear multimedia is referred to as interactive multimedia (IMM) or non-linear multimedia (Damien, 2004). This kind of programme gives the user the ability to influence the sequence of events by choosing various alternatives.

1.3.3 Multimedia in Classroom

The use of multimedia carries with it a special relevance in the classroom. The use of multimedia opens up interesting possibilities for catering to the requirements of students in the 21st century. It has been a significant contributor to the development of novel and improved methods of instruction, as well as to the personalization of education and the establishment of an efficient educational framework for a relatively large number of pupils. Students are motivated to study because of the uniqueness and variety of the available material. Students are encouraged to collaborate in groups, develop their own knowledge, solve issues, review their own work, and present their knowledge in a variety of ways via the use of multimedia activities. According to Joshi (2012), the use of multimedia helps to improve students' ability to retain information, develop a variety of abilities, raise students' self-esteem, and foster high-level thinking. Students gain knowledge while participating in enjoyable activities such as drawings, charts, models, posters, tales, and plays. By providing students with the chance to practise the material that they have learned in a secure and managed setting, a classroom that makes use of multimedia has the potential to close the gap that exists between theory and practise. The distribution of instructional material across numerous modalities, which may include information that is visual and audible,

and the application of this information by students to develop knowledge is what is meant by the term "multimedia learning."



It is no longer possible to argue against the integration of multimedia into the classroom. That will make it feasible for instructors to provide more opportunities to pupils to be happy and to enjoy themselves more while they are in class. The environments of traditional classrooms and multimedia classrooms are quite different from one another. The classroom is set up with rows of desks and a blackboard at the front. The instructor is now delivering a speech to the students while standing in front of the classroom. The atmosphere of conventional classrooms and those of multimedia classrooms are quite different from one another. The seats of students in classrooms equipped with multimedia technology are adaptable to the requirements of each individual activity. Students are provided with an environment that is conducive to learning by having all necessary study tools readily accessible in the classrooms. According to Schroeder (2010), the use of multimedia in education is essential for the efficient identification of learning goals and for the provision of an educational setting in which students are encouraged to take an active role in the

learning process. Traditional methods of education are complemented by the use of various forms of media to improve teaching and learning. Students are more likely to remain interested in the subject matter and retain more information when they are actively engaged in the learning process, which is facilitated by the use of various forms of media. According to Solomon (1979), students are able to more quickly grasp abstract, new, and unique ideas when the information is delivered in both verbal and visual form.

Students in today's generation are very distinct from one another. These pupils are considered digital natives because they were born into a society in which the use of digital technology is ingrained in the fabric of everyday life and because they have never known a world in which technology was not there. They speak technology like it's their first language, and they anticipate being required to utilise it in class. Although some students have better access to technology than others, computers with Internet connectivity are now practically universally accessible in classrooms (Mukhopadhyay, 1990). Some students may have greater access to technology than others. Outside of school, almost everyone has a mobile phone and a computer that can connect to the internet. The use of technology by children and teenagers aged 5 to 18 is at an all-time high and is expected to continue to rise. This growing dependence on technology, when paired with the processing capabilities of the brain, presents a tremendous opportunity for education. According to the findings of several studies, the brain processes information through two distinct channels: the visual and the auditory. When information is provided in both verbal and visual formats, the brain is able to store and process more new data. It is made abundantly evident in (Shuman, 1998) that technology is something to increase human potential rather than a replacement for it, and that it is something that enriches the mental process rather than something that cripples it.

Learning via words and visuals is what we mean when we talk about "multimedia learning." In the context of education, the term "multimedia instruction" refers to the practise of delivering content in a manner that incorporates not just text but also visuals in order to foster student learning. The learning strategy known as multimedia is predicated on the idea that students are more likely to comprehend a concept when it is delivered in the form of words alone. According to Mayer (2009), multimedia may be classified according to the delivery medium, such

as an amplified speaker or a computer screen; the presentation style, such as words and images; or the sensory modalities, such as aural and visual.

Face to face teaching- Engagement in face-to-face interaction is beneficial to synchronous communication. The ability to provide instant feedback to both students and instructors is beneficial to the whole teaching and learning process. In the process of teaching and learning, having a connection that is face-to-face adds a level of personalization that is very motivating for both the instructors and the students.

Student interaction with course content- When they are learning in a traditional classroom setting at a school or institution, students have the opportunity to engage directly with the subject matter of the class through the use of printed materials and learning facilitated by information and communication technology (ICT). They are provided indirect access to the content of the course via a number of interesting and engaging methods.

Peer Group interaction- Students on the campus of a school or college study in a formal setting using a variety of instructional methods; but, they also learn informally through the relationships they develop with their peer groups.

Group discussion and exchange of ideas- In addition to giving chances for student interaction with instructors, instructional strategies that are well-designed for the classroom provide pupils the chance to start conversations with their peers about different aspects of the curriculum and to exchange views.

Viewing expert lectures in YouTube- Blended learning enables students to take use of the knowledge of professionals in the area of the course material that they are currently studying since students are able to readily access various lectures given by recognized experts in a variety of subjects that are hosted on YouTube.

Online learning through videos and audios- There are a variety of recordings and animated movies that are accessible, each of which explains a different idea in a manner that is both straightforward and engaging. They adhere to the notion of reality and maintaining a connection with life in everything that they do.

1.4 IMPACTS OF MULTIPLE MEDIA

Before the emergence of multimedia, there was a significant amount of dispute over whether or not media had an effect on learning. This argument is still mostly unsolved today. According to Clark (1983), any apparent impacts of the media are the product of research that conflates the influence of instructional technique with the influence of the media, and that the media are "mere vehicles that deliver instruction" (Clark, 1983, p. 445). In further research, Clark came to the conclusion that "Media and their attributes have important influences on the cost or speed of learning, but only the use of adequate instructional methods will influence learning" (Clark, 1994, p. 27). However, a number of authors have questioned the usefulness of such a "media-centered debate" (Jonassen, Campbell, and Davidson, 1994, page 31), and they suggest approaching the question not in terms of whether or not media affect learning, but rather by asking: "In what ways can we use the capabilities of media to influence learning for particular students, tasks, and situations?" (Jonassen, Campbell, and Davidson, 1994, page 31). (Kozma, 1994, p. 18). An example of an educational technology that has been used in the classroom for a considerable amount of time is interactive video, in which the learner's reaction dictates both the sequence in which the material is presented and the sort of content that is presented. (McNeil & Nelson, 1991) conducted a meta-analysis of 63 studies that looked at the achievement results of using interactive video. The researchers looked at 100 impact variables and concluded that 51 of the effects were substantially positive, 5 were significantly negative, and the remaining effects were not significant. What accounts for the differences in findings? These researchers first coded 79 independent variables across all of the various studies, but they came to the conclusion that they were unable to explain a significant portion of the variation due to "a myriad of variables that are difficult or impossible to account for in a single meta-analysis" (McNeil & Nelson, 1991, p. 5). Despite the fact that these researchers initially recorded 79 independent variables, they concluded that they had failed to explain a significant portion of the variance.

In the meta-analysis conducted by Liao (1999), 17 variables were coded for each of the 46 studies on multimedia learning that reported a total of 143 effects on learning. Of these 143 effects, 86 (60%) were favorable in favor of using multimedia, 53 (37%) were negative, and only 4 (3%) were null. It was discovered that four of the factors had an influence on the effect size that was statistically significant. These variables were (a) instrumentation, (b) the kind of study design, (c)

the type of delivery method, and (d) the comparison group. The study came to the conclusion that, in general, the use of multimedia may have a marginally beneficial impact on the education of students but added: "Left unanswered is the question of what factors truly affect the diverse outcomes for different types of instructions" (Liao, 1999, p. 272)

A significant portion of multimedia is predicated on the combination of visual and audio modalities of presentation. The research that has been done on how individuals interpret audio-visual information has shown several complexities. For instance, individuals have stronger short-term recollection of auditory information than of visual information (Penney, 1989). Additionally, people require narration to acquire effective teaching from animation (Mayer & Anderson, 1991). On the other hand, people will read a paper on screen while disregarding a narrated summary (Grimes, 1990). According to Lang (1995, page 86), "Forty years of research has yielded a hodgepodge of contradictory conclusions" in the field of audio-video redundancy. Half of the studies showed that redundant audio and video channels improve retention of information, and the other half showed that redundancy impedes retention. Again, it is quite evident that there are a great deal of varying components involved. According to Dubois and Vial (2000), one of these contingencies is determining whether or not the redundant information permits dual-coding of information in both propositional and visual form. Numerous research (Paivio, 1991; Mayer & Sims, 1994; Mayer & Moreno, 1998) indicate that human memory and cognition is dependent on the distinct coding of visual and verbal information. These investigations were carried out by Mayer & Sims.

There is a growing body of research suggesting that the "multi" in multimedia may lead to poorly planned training that impedes learning. These studies have been conducted in a variety of contexts. For instance, Mousavi, Low, and Sweller (1995) discovered that giving instruction in both aural and visual modes might result in a phenomenon known as the "split-attention" effect, in which students are forced to divide their attention between several inputs, which leads to a reduction in the amount of information that they are able to comprehend. According to the findings of many research (Barron & Atkins, 1994; Beccue, Vila, & Whitley, 2001), the addition of audio instructions to visual text and/or visuals does not result in an increase in the amount of information that is learned. In addition, Kalyuga and his colleagues found that learning might be hindered when the same information is presented concurrently in both aural and visual formats. These researchers

provided an explanation for their results by referring to the cognitive load hypothesis (Kalyuga, Chandler, & Sweller, 1999; Kalyuga, 2000; Kalyuga, Chandler, & Sweller, 2001a). This theory postulates that working memory may become overloaded with duplicate information. Based on this condensed overview, it is clear that there are a lot of different aspects that go into establishing how successful multimedia is. It is abundantly evident that an integrated model is required, one that provides a summary of the important components as well as their interdependencies.

1.5 MODEL FEATURING INTEGRATION

Figure 1 illustrates the suggested integrated model of the consequences of using many media formats. Constructs at the theoretical level and variables at the operational level are both represented by the numerous conceptual components that are denoted by the boxes and ellipses in the model. The majority of the conceptual components are, in point of fact, multi-dimensional, which is denoted by the dot-points, which also signify additional constructions and variables. The direction of the arrows in the model indicates the kind of link that exists between the various conceptual parts. The whole model, which consists of 12 interconnected and interdependent conceptual parts (the majority of which comprise sub elements), is obviously rather complicated. On the other hand, it has been claimed that this level of complexity is necessary for the model in order for it to adequately account for the great variety of findings obtained from research on the impacts of multimedia. The components of the model may be broken down into the following categories for the sake of clarity:

1. Multimedia input, which includes the following three components: visual input, auditory input, and learner control;
2. cognitive processing, which includes the following two components: attention, and working memory;
3. learner dynamics, which includes the following three components: motivation, cognitive engagement, and learner style; and
4. knowledge and learning, which includes the following four components: intelligence, reflection, long-term storage, and learning.

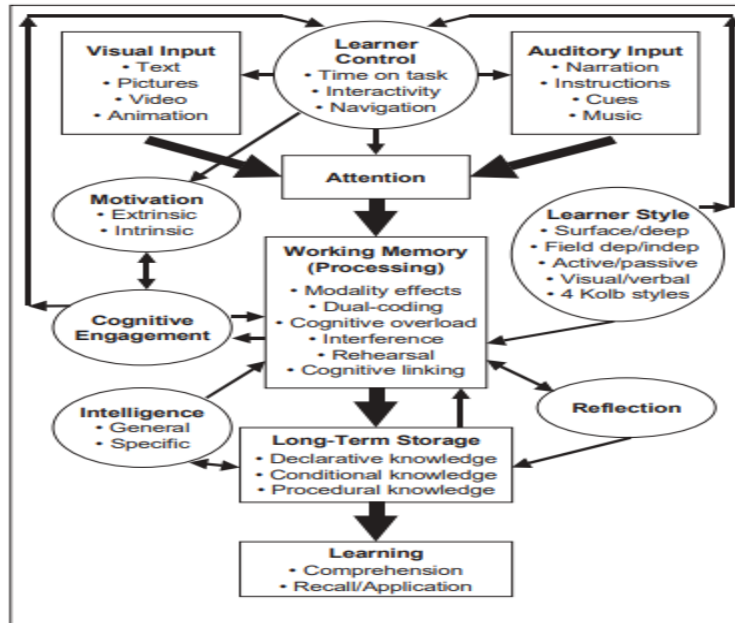


Figure 1: An integrated model of how different types of media affect the learning process

1.5.1 Multimedia Input

Figure 1 shows the first set of aspects that need to be handled in an integrated model. These elements are those that relate to input, which is the means through which the learner accesses the content of the instructional material. Vision and hearing are the two basic input modalities that are used. Text, images, diagrams, moving pictures, and animation are all examples of forms that may be used for visual input. A narration or commentary, directions, cues, or piece of music may all be classified as types of auditory input. The creation of multimedia may be accomplished with any combination of the aforementioned inputs; however, not all combinations are capable of producing satisfactory results. Multimedia not only offers a range of audio and visual stimuli, but also gives the student control over those inputs in a number of different ways. According to Farrell and Moore (2000) and Tripp (2001), design characteristics provide the student with assistance in navigating among the numerous sources of information offered in a multimedia environment. Learners may access content-rich databases via the use of hyperlinks that are included in links, which enables them to obtain more specific information. Interaction is something that may be conceptualised in many various ways in the literature (Sims, 2000; Kettanurak, Ramamurthy, & Haseman, 2001). Multimedia is able to give learners with variable degrees of interaction at their disposal. According to McNeil and Nelson (1991), there is some evidence that

learner control is less effective than programme control. This is despite the fact that learner control is often thought of as a beneficial aspect of multimedia. According to Stemler (1997), the level of control given to the learner in multimedia presentations has to be tailored to the abilities of the individual student.

1.5.2 Cognitive Processing

The next category of considerations includes those that are relevant to the operation of processing the data obtained from the input sources (Figure 1). Attention and working memory are the two components of an integrated model that need to be considered here. Although there is evidence that numerous inputs may be monitored concurrently at the perceptual level, attention helps to concentrate the learner's emphasis on a single input at a time (Hede, 1976, 1980). This is accomplished via the use of attention.

The working memory is where the majority of the processing takes place, and it is in this memory that the true difficulties of dealing with multimedia come into play. Baddeley (1992) was the one who first proposed the concept of working memory, which has since been extensively embraced by researchers in the field of multimedia (Niaz and Logie, 1993; Mayer, Bove, Bryman, Mars, and Tapangco, 1996; Mousavi, Low, and Sweller, 1995). Working memory consists of an executive processor in addition to two short-term stores known as a "phonological loop" and a "visuo-spatial sketchpad." Both of these are referred to as "phonological loops." It should be noted that "subvocal rehearsal" in the phonological loop is responsible for the retention of verbal data (encompassing both text and narrative) for more than a few seconds (Baddeley, 1992). The method in which working memory processes information relating to multimedia is influenced by a variety of different elements. First, dual-coding allows for the simultaneous processing of auditory and visual inputs, which results in what are known as modality effects (Penney, 1989; Mousavi et al., 1995; Tindall-Ford, Chandler, & Sweller, 1997) (Mousavi et al., 1995; Tindall-Ford, Chandler, & Sweller, 1997). Another component that was mentioned before is cognitive overload, which happens when the amount of information entering the brain surpasses the capacity of the working memory. This may happen, for instance, when the same information is acquired from more than one source of input (Mousavi et al., 1995; Kalyuga, 2000). Interference is yet another probable component. This occurs when the semantic processing of information obtained from one source is disrupted by information obtained from another source. One further

factor that determines whether or not knowledge is retained is whether or not it is practised. Cognitive linking is the last component of working memory, and it is responsible for establishing referential linkages between verbal and visual representations (Mayer and Anderson, 1991; Mayer and Sims, 1994; Mayer et al., 1996).

1.5.3 The Dynamics of the Learner

Learner dynamics may be broken down into three different conceptual subcategories. The first is motivation, which is supported by a significant body of research indicating that it is an important factor in the learning process (Taylor, Sumner, & Law, 1997). It is believed that extrinsically motivated factors, such as the design features of a multimedia package, provide some initial incentive for learners to access the material; however, sustained effort only occurs when learners encounter intrinsically motivated factors, which are provided by interesting and challenging content (Najjar, 1998). The latter also results in cognitive engagement, which may be defined as the process by which students feel motivated to assume full responsibility for their own education (Stoney & Oliver, 1999). According to the integrated model, the many components of learner motivation have an effect on learner control, particularly the amount of time and effort learners put into interacting with various forms of multimedia.

Learner styles may be classified in a number of different ways, each of which has an impact on the manner in which individuals interact with multimedia. Dillon and Gabbard (1998) conducted a study of three methods to learner style that have been used in the research on multimedia. The first makes a distinction between field dependency and field independence, which indicates the degree to which a learner is dependent on the setting in which knowledge is provided. The second method employs a classification system that divides students into two categories: surface processors and deep processors of material. Surface processors depend on memorization and practise, while deep processors use content-structuring strategies that are more likely to be successful in an environment rich in multimedia. The third strategy takes into account the many ways in which people learn, categorising them as active, passive, or somewhere in between. Depending on the kind of learner, certain aspects of a multimedia presentation will be more suitable. According to Smith and Woody (2000), there are two types of people: those who process information visually, and those who process information verbally. They found that learners who process information visually benefit the most from using multimedia. (Karakaya, 2001; Kettanurak

et al., 2001; Kraus, Reed, & Fitzgerald, 2001) Finally, a number of recent research have studied multimedia in terms of the Kolb Learning Style Inventory, which identifies four categories of learners: (a) divergers; (b) assimilators; (c) converges; and (d) accommodators. An integrated model is required in order to accommodate these many ways of approaching the learning process.

1.5.4 Learning and Acquiring of Knowledge

Intelligence, reflection, long-term storage, and learning make up the last set of components. (A) intelligence; (B) reflection; (C) long-term storage; and (D) learning. According to Fetherston (1998), intelligence is multi-faceted and involves seven distinct intelligences. The more of these intelligences that are engaged by a multimedia package, the more successful it will be. According to Taylor, Summer, and Law (1997), the act of reflection is connected to self-directed learning and requires students to engage in critical thought on both their existing knowledge and the methods by which they learn.

The second component is long-term storage, which is where an individual's acquired knowledge is kept. Long-term storage gets processed information from working memory, but it also gives working memory with the foundation for cognitive linking. Cognitive linking is the process by which links are made between newly learned material and what is previously known. Long-term storage receives processed information from working memory. According to Yildirim, Ozden, and Aksu (2001), it is important to make a distinction between declarative knowledge, conditional knowledge, and procedural knowledge, all of which are engaged in the process of learning. (Kalyuga, Chandler, Tuovinen, & Sweller, 2001c; Kalyuga, Chandler, & Sweller, 1998, 2000, 2001c; Kalyuga, Chandler, & Sweller, 2001b) Research has demonstrated that the degree of learner knowledge and experience has a significant impact on the relative success of various multimedia learning techniques. Learning is always the last component to be included in any model of the impacts of multimedia. The immediate degree of understanding of content obtained via multimedia, as addition to the capacity to retain and apply previously learned knowledge, are all included in the conceptual aspect of learning.

1.6 THE ROLE OF THE TEACHER IN A MULTIMEDIA CLASSROOM IS A CRUCIAL ASPECT TO CONSIDER.

According to Schroeder (2012), the integration of multimedia in the classroom setting can effectively capture the attention of students, engage them in the learning process, facilitate comprehension of complex concepts, stimulate creativity, and promote enjoyment. The responsibilities of educators in a multimedia classroom encompass the subsequent tasks:

- i. The utilization of multimedia can facilitate the transformation of a teacher-centered approach to a student-centered approach by the teacher.
- ii. The educator must implement various inventive approaches and methodologies.
- iii. The educator must possess knowledge regarding the various media options that are accessible.
- iv. The instructor ought to possess physical proficiency in utilising and exhibiting the application of various media.
- v. Teachers' ought to possess the necessary skills to select appropriate media and demonstrate competence in their sequential integration in a methodical fashion.
- vi. The role of the teacher is that of a facilitator or manager of activities.
- vii. The teacher is responsible for guiding their students towards achieving independent and personalised learning.

1.7. NEED AND IMPORTANCE OF THE STUDY

The purpose of this study is to investigate the effect of integrated multimedia in teaching science for high school students, also known as the students now enrolled at the school who will eventually form the next generation. The concept of integrated multimedia teaching is becoming more important in the modern world. The tactics and components of integrated multimedia education that are already in place will continue to be used since they fulfill both informational and cultural functions. In order to educate effectively, having access to physical items as well as social contexts is essential. These expectations will likewise rise as a result of their digital surroundings. Because the components of integrated multimedia are so effective, students will have the ability to easily communicate and share resources related to common knowledge when it is required. It is possible for professional learners to collaborate on occasion

utilizing common knowledge sources in order to address real-world difficulties. Many of the components of integrated multimedia will be adapted to work in digital format when they are implemented in high schools. As a result of this, the investigator has a strong interest in determining whether or not the integrated multimedia approach of training is effective. As a result, the present research is both critically important and urgently required at this juncture.

1.8 STATEMENT OF PROBLEM

"The Effects that integrated multimedia in teaching science for High School Students" The researcher made an attempt to figure out which kind of instruction leads to greater levels of student achievement. Throughout the course of the investigation, the researcher employed both conventional teaching methods and integrated multimedia teaching strategies. There were two non - equivalent groups

- Class VII – A is considered as the experimental group
- Class VII – B is considered as the control group

1.9 OBJECTIVES OF THE STUDY

1. To identify the achievement level of students of VII standard in learning of science (Light lesson) by using conventional method of teaching.
2. To identify the achievement level of students of VII standard in learning of science (Light lesson) by using integrated multimedia method of teaching.
3. To prepare images, text, video and sound for one unit (Light lesson) to teach the related content of the unit for VII standard students
4. To adopt integrated multimedia method of teaching for high school students to learn the science concept (light).
5. To find out the effect of treatment given through integrated multimedia teaching over the traditional method of teaching.
6. To find the effect of Integrated multimedia method of teaching science concept (light) among the high school students.

7. To compare the effect of integrated multimedia method of teaching and learning based on gender.
8. To compare the effect of integrated multimedia method of teaching and learning based on parent's qualification.
9. To compare the effect of integrated multimedia method of teaching and learning based on age group.

1.10. LIMITATIONS OF THE STUDY

Research studies in general and experimental studies in particular, have limitations due to many factors. It is responsibility of the researcher to see that the study is conducted with maximum care in order to be reliable. However, the following limitation are unavailable while conducting the present study.

- The present study, being of an experimental nature, was confined to selected school in Pattiveeranpatti.
- As the objective of the present study was limited to a specific discipline, it was restricted to the subject Science.
- The time factor forced the investigator to limit the number of sample to 60 to be selected from 1 school located in Pattiveeranpatti.

1.10 HYPOTHESES OF THE STUDY:

1. There is no significant difference between the achievement level of students taught through conventional and integrated multimedia method of teaching.
2. There is no significant difference in the academic achievement of boys and girls taught through integrated multimedia method of teaching based on the age
3. There is no significant difference in the academic achievement of boys and girls based on the favorite mode of learning.

4. There is no significant difference in the academic achievement of students taught through integrated multimedia method of teaching based on the influence of mother's educational qualification.
5. There is no significant difference in the academic achievement of students taught through integrated multimedia method of teaching based on the influence of father's educational qualification.

1.11 ORGANIZATION OF THE THESIS

This study '**Effect of Integrated Multimedia in Teaching Science for High School Students** is presented in five chapters.

- **First Chapter**- deals with the introduction, scope of the study, need, objectives, hypothesis and advantages and limitations.
- **Second Chapter**- gives the account of the review of the literature connected with the topic.
- **Third Chapter**- deals with the methodology, samples, and tools, method of administration and collection of data.
- **Fourth Chapter**- deals with the classification, analysis and interpretation of data.
- **Fifth Chapter**- presents the summary of the findings, discussion, recommendations, suggestions for further study and conclusion.

REVIEW OF LITERATURE

CHAPTER – 2

REVIEW OF LITERARUTE

2.1 INTRODUCTION

The scope of this section is confined to a review of previous studies. The present study received assistance from these studies in terms of arranging the strategy and developing the research profile. These evaluations may be useful in restricting the design principles for research and may also aid the researcher in comprehending the study's study objectives. Both of these benefits may be gained through doing the evaluations. The primary objective of compiling these assessments from a variety of sources is to establish fundamental facts that are essential for presenting the subject matter of the research area that is the focus of the current study. On the basis of previous experiences, the researcher would be worried if they decided not to repeat the investigation. In addition to this, it may equip you with the information and abilities you want to understand the experience of developing the framework for the research project. In addition, the study that has been done could provide useful information regarding areas that have not yet been found. Attitude toward mixed learning and perception of integrated multimedia learning make up the two halves of the analysis of prior research, which have been split down the middle.

2.2 THEORETICAL FRAME WORK

Strong theoretical research is much needed for research. It helps the investigator to proceed the research in the right path. The present study is based on the theoretical framework of conventional method of teaching vs integrated multimedia teaching. The integrated multimedia teaching included in the classroom. This chapter addresses the theoretical aspects of integrated multimedia and conventional method of teaching.

2.3 INTEGRATED MULTIMEDIA

Computer is inevitable part in every walk of the life today. The world has shrieked in to a global village. Satellite communication revolutionized the old communication methods. Globalization and liberalization created impact on the teaching learning process. Integrated multimedia method of teaching helps the students to learn for betterment. It stops the stereotype

of classroom effects. It makes the students to interact more and more. This will help to improve their communication skills also. Integrated multimedia method is effective for all kind of learners. The education system started to adopt various methods of teaching other than conventional method of teaching.

Koshti Deepakkumar S., Dr. Veenaben Patel (2020)'s study, "Construction and Try out of Multimedia Package on Achievement in Chemistry Subject of Students of Standard XII", Multimedia is continuous developing technology in every field. It is highly using for entertainment purposes. Now all these technologies are implemented in education field. In past, many times it was proved that multimedia is highly effective on educational achievement of secondary schools' students. Still expansion of new dimensions it's necessary to prove this method time to time. In present study the researcher has once again try prove the effectiveness of multimedia package on achievement in Chemistry subject of students of standard 12.

V.K. Subashini, (2016) presented a study on the effectiveness of multimedia in teaching computer science among xi standard students in karur district, Education, in the present day context, is perhaps the single most important means for individuals to improve personal endowments, build capability levels, and overcome the constraints. Education is important not merely as means to other ends, but it is an attribute that is valued in itself, by most individuals. More importantly, it is a critical invasive instrument for bringing about social, economic and political inclusion and a durable integration of people, particularly those 'excluded', from the mainstream of any society. Computer Science today is about learning to understand the media we use every day. This idea for Computer Science has been around since at least the early 1960's but is most accessible through the well-known and highly regarded McLuhan statement "The medium is the message". Today, in the era of web 2.0, you are quite likely to think of social media, texting, and e-mail as common media you use frequently. In the strictest sense of the word, *multimedia* simply means "more than one medium". In other words, television programs, movies, even illustrated books are all examples of multimedia – they all use combinations of text, images, sounds, and movement.

K. Thiyagu (2014) influence of multimedia package in enhancing Attitudes towards computer science, Multimedia is so versatile by nature and that they have become dispensable to teachers, students and student-teachers than other professionals as they were the architects of the future generation of a nation so the investigator selected a topic for research entitled, "Influence of multimedia package in enhancing attitudes towards computer science". The present study found out the influence of multimedia package in enhancing the attitude towards computer sciences. The study was conducted to develop a multimedia package for the higher secondary school students in the computer science subject and finding out its effectiveness over the conventional method of teaching in enhancing attitude towards computer science. Two equivalent group experimental-designs are employed for this study. The investigator has chosen 40 students from standard IX were selected as sample by using simple random technique. According to the scoring of computer science achievement, 20 students were chosen as control group and 20 students were chosen as experimental group. Finally, the investigator concludes that; (a) There is no significant mean difference between the attitude of experimental group and control group in the pre-test. (b) There is significant mean difference between the attitude of experimental group and control group in the post-test. (c) There is no significant mean difference between the attitude of control group in pre-test and post-test. (d) There is no significant mean difference between the attitude of experimental group in pre-test and post test.

Celeste Ferreira, Mónica Baptista, Agnaldo Arroio (2013), Since the widespread introduction of Information and Communication Technology (ICT) in education the use of multimedia environments has increased substantially. This qualitative study analyse how teachers integrate multimedia tools into teaching and learning sequences (TLS) in science education. Four in-service teachers' groups have been investigated across a 40 h teachers' training course to analyse their pedagogical strategies and difficulties for introducing multimedia tools in science teaching. During the training program to discuss multimedia environments teachers (n=14) were invited to build teaching learning sequences (TLS) about some science content using multimedia tools. The results obtained through a content analysis suggest that these teachers are integrating multimedia tools mostly to enhance particular concepts and skills (integrated approach) than to innovate presentations (enhancement approach). In all cases teachers adopted structured tasks and in two of

these they were not aware of the necessity to make explicit links between the multimedia tools and the other activities. Some difficulties related to pedagogical approaches and teachers' knowledge are discussed.

Herbert C.B. Manalu, Saronom Silaban, Wesly Hutabarat (2018), in their study, *The Development of Teaching Materials: Stoichiometric Integrated Multimedia Easy Sketch*, The most important factor to achieve learning success is the use of learning media as teaching materials. The learning media used must be interesting so that students will be more motivated and active in following the learning process. One effort to do is by developing the teaching materials integrated of Easy Sketch multimedia. This study aims to analyze teaching materials developed by using the Easy Sketch program on stoichiometric material. Research method using Development Research by stages Analysis, Design, Development, Implementation and Evaluation (ADDIE). The research instruments are questionnaire and objective test. The feasibility of using chemical learning media is analyzed based on the standard data of content, appearance, materials and programming. Data were obtained by using validation sheets that have been validated by a team of experts. The first step in development is the analysis of teaching materials available in Senior High School State Pangkatan, Labuhanbatu regency (SMA Negeri 1 Pangkatan, Labuhanbatu regency). The result of learning media X analysis as a whole is feasible and the learning media Y is quite feasible but still needs to be revised and developed

Di (Laura) Chen, Dustin Freeman, Ravin Balakrishnan,(2019) the purpose of their research “Integrating Multimedia Tools to Enrich Interactions in Live Streaming for Language Learning” is Online language lessons have adopted live broadcasted videos to provide more real-time interactive experiences between language teachers and learners. However, learner interactions are primarily limited to the built-in text chat in the live stream. Using text alone, learners cannot get feedback on important aspects of a language, such as speaking skills, that are afforded only by offering richer types of interactions. We present results from a 2-week in-the-wild study, in which we investigate the use of text, audio, video, image, and stickers as interaction tools for language teachers and learners in live streaming. Our language teacher explored three different teaching strategies over four live streamed English lessons, while nine students watched and interacted using multimodal tools. The findings reveal that multimodal communication yields instant

feedback and increased engagement, but its use is dependent on factors such as group size, surroundings, time, and online identity.

Tse-Kian Neo & Mai Neo (2004), "Integrating multimedia into the Malaysian classroom: Engaging students in interactive learning" In recent years, with the infusion of the multimedia technology into the education arena, traditional educational materials can be translated into interactive electronic form through the use of multimedia authoring tools. This has allowed teachers to design and incorporate multimedia elements and choreograph them in an orderly sequence to convey the message in an interactive and multi-sensory learning environment. The focus in education is thus moving away from the conventional "chalk-and-talk" method to one which uses multimedia as the instructional media and a platform in teaching and learning.

This presentation focuses on using the multimedia design process (MDP) to enable educators to re-design their educational curricula into an interactive and media-rich learning environment. This multimedia educational design process will reinforce and strengthen the traditional instructional communication process (ICP) and foster a number of innovative methods to communicate knowledge to the learners. In this context, there is a need to adjust the educator's approach to teaching, preparing content and delivering learning materials. As the present generation becomes more familiar with computers and the Internet, they are going to expect information in the classrooms to be delivered in the same pattern.

A recent meta-analysis conducted in the United States by the Department of Education (US Department of Education, 2009) examined the effectiveness of in-person and online training. Its results, which were mostly based on research conducted in higher education, indicated that, on average, students who participated in online courses fared better than those who participated in face-to-face sessions that were equivalent. Surprisingly, students who were educated in environments that included several types of learning exhibited the greatest improvement. The writers made it a point to emphasize that the variances were caused less by the technology itself and more by the affordances that were supplied by it.

Kokom KOMALASARI, Didin SARIPUDIN (2017), Value-Based Interactive Multimedia Development through Integrated Practice for the Formation of Students' Character, This study

aims to describe the development of value-based interactive multimedia through integrated practice for the formation of students' character. This study uses Research and Development Design at the Department of Social Sciences Education at Indonesia University of Education. Conceptually, the design in question is integration of living values and social studies learning materials into interactive multimedia by involving students through an integrated practice in schools (university and junior high school). Implementation of the design is realized through several steps: negotiation of subject matter and character, presentation of materials, group distribution based on social science topics, exploration of character values according to the topics, integrated practice (initial observation to school, multimedia scenario development, multimedia production, multimedia simulations in class, and multimedia utilization in school). Implementation of the interactive multimedia design significantly affects the formation of students' character.

In 2006, Akkoyunlu and Soylu conducted a study to investigate the perspectives of students with regard to mixed learning settings. The findings indicated that the students enjoyed taking part in the activity in which they were exposed to a variety of teaching methods. The level of academic accomplishment students had and the amount of time they spent participating in forums was a major factor in determining how they felt about the blended learning environment. The implementation of blended learning in which face-to-face interaction was included obtained the highest grade. This result demonstrated how important communication and participation are to the success of online learning.

Suzanne S. Stensaas, (1993) *Animating the curriculum: integrating multimedia into teaching*, studied at many medical schools, the medical library assists faculty in finding and integrating new technology into the classroom, student laboratories, and lecture or small group sessions. Libraries also provide faculty with a place to do development. This paper recounts the author's experience creating software-based educational materials. In the process of creating the Slice of Life videodisc and developing and distributing other medical education software, techniques that do and do not work in producing multimedia for medical education became evident. Use of multimedia features and new modalities not possible with books, rather than development of electronic versions of texts and atlases, should be emphasized. Important human factors include collaboration, continuity, evaluation, and sharing of equipment, software, code, effort, expertise, and

experiences. Distribution and technical support also are important activities in which medical libraries can participate.

Fatimah Puteh & Siti Shuhaida Shukor Fakulti Pendidikan, *The Integration Of Multimedia Elements In Classroom Teaching Among TESL Teacher-Trainees* states that The integration of multimedia in classroom teaching has brought education into one step higher from the traditional technique or better known as “chalk and talk” teaching method to a more interactive and interesting teaching and learning process. The aim of this study is to investigate the extent to which multimedia is incorporated in classroom teaching among TESL teacher-trainees during the practical teaching. A total of 50 respondents consisting of third and fourth year TESL teacher-trainees from Universiti Teknologi Malaysia participated. This study also aims to find out whether or not the TESL teacher-trainees integrate multimedia in classroom teaching and if they do, the study aims to identify the multimedia elements they frequently use and if not, the study wants to find out the reasons for not integrating multimedia in their classroom teaching. Based on the result, it was reported that even among those who integrate multimedia, there are limitations to incorporate it in classroom teaching and this study has identified these limitations. Besides that, the benefits resulting from the integration of multimedia have also been identified. The result of the data analysis revealed four major findings namely the forms of multimedia incorporated in classroom teaching by TESL teacher-trainees, the benefits of the integrating multimedia in the classroom, the limitations, as well as the reasons for not integrating multimedia in classroom teaching during the practical teaching. Based on the findings, several conclusions and recommendations are drawn in order to improve the incorporation of multimedia in classroom teaching.

Panel Paul Brett, (2000), *Integrating multimedia into the Business English curriculum: a case study* Opportunities to deliver language learning through computer-based multimedia environments, with their capacity to deliver and juxtapose all the traditional media of language learning alongside pedagogic tasks, are set to increase with the expansion of digital communications. Multimedia’s emergence has implications for self-study and integration with institutional classroom-based instruction. This article describes the formal integration of two interactive multimedia Business English CD-ROMs into the self-study curriculum of sixty undergraduate learners. Data on learners’

attitudes, changes in their attitudes, learner strategies, patterns of use and performance on a formal test were collected to evaluate this curriculum innovation. Positive learner evaluations, for the use of multimedia, for its perceived learning effects and as means for self-study, together with self-reports of productive language learning strategies and comparable achievements on the formal test, provided evidence for the success of the innovation. Decreases in the strength of positive evaluations, the use of some unproductive strategies and problems with hardware availability revealed aspects of the innovation needing reconsideration.

Jerry Wellington (1999), *Integrating multimedia into science teaching: barriers and benefits*, Reports on the " Chemistry School" Project which explored the practicalities of using multimedia in secondary school science departments. Finds that although multimedia has many benefits for subject teachers, the problems of using it in everyday teaching are quite complex. Argues that simply training teachers to use information and communication technology will not be enough to bring it into subject teaching.

Ocak and Aksayur (2013) conducted a study in which they investigated whether or not the academic performance of treatment groups improved when systematically designed motivational strategies based on Keller's ARCS model (attention, relevance, confidence, and satisfaction) were implemented. Additionally, the researchers investigated whether or not the treatment groups' levels of motivation increased statistically significantly. The training session, which ran for a total of three weeks and was attended by ninety first-year college students, focused on teaching participants how to use the Microsoft Access database tool. The method of quantitative research that was used for the examination of the gathered data included the utilization of a survey about motivation in addition to an academic achievement test. The findings suggest that it may be possible to improve academic achievement and learner motivation in general by using extraneous variables such as motivating tactics. In the context of blended learning, this research demonstrates how the ARCS model has the potential to boost both the academic performance and the motivation of students.

Yang Shu (2020) in the research work *Experimental data analysis of college English teaching based on computer multimedia technology* In practical English teaching, the level of multimedia application of teachers is uneven, and it is not completely clear about the integration meaning, integration methods, and integration strategies of multimedia and curriculum teaching. There are also many problems that need to be solved urgently in teaching. This paper uses English translation for the application of computer multimedia-assisted teaching, and uses multimedia resources, online translation software, and online English translation tests to fully mobilize students' interest in learning. The use of multimedia-assisted teaching resources is to create a real English learning environment for students, focusing on strengthening the training of college English translation, so that students really feel the standard English translation and grammar knowledge. This provides a reference for the construction of English teaching network. Practice has proved that the application of task-based language teaching method in English multimedia translation classroom teaching has significant advantages. It combines the advantages of modern multimedia technology and task-based language teaching method. It integrates multimedia courseware, teachers and students through a series of tasks, forming a dynamic teaching model. It is advisable to optimize college English multimedia classroom teaching and improve students' language awareness and ability.

Haftamu Menker GebreYohannes, A Hadi Bhatti, Raza Hasan (2016), on the study *Impact of multimedia in Teaching Mathematics*, stated that In this paper, we are going to examine issues within the new frontier of integrating technology into mathematics education. We present an approach on how to teach mathematics courses by integrating meaningful multimedia technology to foster the learning process. Specifically, this paper focuses on how the integration of multimedia-based teaching approach into a Calculus and Numerical Methods module impact on student's performance and their attitudes toward educational technology. Empirical data will be collected from controlled and experimental group students enrolled into this mathematics module which include students' engagement using traditional and multimedia technology teaching and learning process.

Chunxiao Cui, Jun Zhang, Jingrong Liu, Ting Wang (2021), *Practical analysis of integrated multimedia technology in medical imaging teaching*, With the innovation of multimedia technology, a new technology, penetrating deeply into all levels of society, the current education

ecosystem will usher in a huge historic change. However, the course of medical imaging is abstract and requires a long time and many times of practice, so it is better to cooperate with multimedia technology for teaching. Based on this, the author of this paper discusses the practice of integrating multimedia technology in medical imaging teaching.

Timothy Ellis, Maxine Cohen (2021), *Integrating multimedia into a distance learning environment: Is the game worth the candle?* Studied that an online learning environment (OLE) appears to be a setting in which multimedia enhancements could indeed provide noteworthy benefits. As a form of distance learning, the OLE offers a rather barren environment featuring limited student-to-teacher and student-to-student interaction, limited lecture capabilities, and severely restricted presentation capacity. Laurillard (1998, 1993), Daniels (1994), McCarthy (1997) and Riding and Grimley (1999) suggested various manners in which multimedia enhancements could be effectively used.

Siyi Gao, (2019) in the study *Integrating multimedia technology into teaching Chinese as a foreign language: a field study on perspectives of teachers in Northern California*, This field study investigated the current use of multimedia technology in teaching Chinese as a foreign language in Northern California, as well as the barriers and challenges that TCFL teachers have encountered in their practice. An online survey was developed to collect data from 75 local TCFL teachers in Northern California. Findings indicated that most teachers felt they were competent enough in using multimedia technology. About half of the TCFL teachers had never received formal training on multimedia skills, even though they did not view a lack of training opportunities as a major barrier to multimedia use. The lack of school funding was the most critical factor in hindering teachers' use of multimedia. The study argues for the need to provide more support to TCFL teachers at the institutional level. More training programs are also needed to prepare teachers for a shift of role from traditional sources of knowledge to facilitators of technology-mediated learning.

Insook Han, Miri Eom, Won Sug Shin (2013), conducted research on Multimedia case-based learning to enhance pre-service teachers' knowledge integration for teaching with technologies, This study investigates the effects of case-based learning on pre-service teachers' knowledge integration related to teaching with technologies. 78 pre-service teachers were provided with interventions that included either video cases or no cases. ANCOVAs were performed to compare two groups' TPACK scores representing technological, pedagogical and content knowledge, and their integration. The results showed that video cases improved pre-service teachers' perceived learning of technological and pedagogical knowledge, and knowledge integration of these knowledge areas. However, content-relevant knowledge for technology integration was not developed through case-based learning. The results were discussed in the context of current teacher preparation programs.

Susan E Anderson (1998), stated that Integrating multimedia multicultural materials into an educational psychology course, this article reports a case study of students' reactions to a multicultural unit that incorporated computer software, videodiscs, videotape, and print media in an undergraduate educational psychology course. The purposes of the unit were to increase students' sensitivity to people from cultures different than their own, to provide an example of applying learning theories in teaching, and to model the integration of technology into instruction. The class consisted of 32 Caucasian females attending a relatively small, private university. At the end of the semester students believed that ethnic diversity in their future classrooms was more important than they did at the beginning of the semester. Many students believed the multicultural unit increased their understanding of cultural differences and recognized the need to learn how to deal effectively with cultural diversity in their classrooms. For the most part, they responded positively to the variety of media used in the unit.

Noordin Syazwan, Wan Fatimah Wan Ahmad, Kwang Hooi Yew, in the study Study of effectiveness and usability of multimedia courseware integrated with 3-dimensional model as a teaching aid, Tools based on Information Communication Technology (ICT) face serious usability problem for effective implementation in education delivery. This paper presents the study of a

multimedia courseware using 3-Dimensional (3D) model for teaching a mathematical topic on Lines and Planes in 3-Dimensions. A field study with experimental approach was carried out on randomly selected students whereby a group of students was exposed to conventional learning, whereas the other group was aided with 3D visualization software. We conclude that the latter group showed significant improvement in attention, response and recall of the content

Antoine Rosset, Osman Ratib, Antoine Geissbuhler, Jean-Paul Vallée (2002), in the study Integration of a multimedia teaching and reference database in a PACS environment says that, In one radiology department, a computerized authoring and editing environment was developed and integrated with the picture archiving and communication systems (PACS) for creation of image-based electronic teaching files to replace a collection of printed film images. This multimedia database and authoring environment allows physicians to create reference databases for teaching and research directly from clinical cases being reviewed on PACS diagnostic workstations. The database engine allows users to generate stand-alone CD-ROMs (compact disks, read-only memory) and World Wide Web-based teaching files. The system is fully compliant with the Digital Imaging and Communications in Medicine (DICOM) standard and supports a large number of standard multimedia image file formats.

Yuliang Liu (2013) A comparative study of integrating multimedia into the third-grade math curriculum to improve math learning, recommends that this quasi-experimental study was to design, develop, and implement one multimedia math lesson in third grade to improve students' math learning. The non-equivalent control group design was used. The experimental group had 11 third grade students and the control group had 15 third grade students in an african american predominated elementary school in the midwest of uSa. The independent variable was the multimedia math lesson and the dependent variable was students' math performance. it was hypothesized that the (a) teacher and students scored favorably about the multimedia math lesson,(b) students were very attentive to multimedia math instruction, and (c) the students scored statistically higher on the posttest at the end of the intervention in the experimental group than in

the control group. The findings have theoretical and practical international implications for K-12 education.

Multimedia refers to the integration of different media such as text, graphics, animation, sound, video (digital or analog), imaging, and spatial modeling into a computer system where appropriate (Jonasson, 2000). According to Bork (1992), a multimedia learning environment is a new paradigm for learning in current education. This is especially true for mathematics learning. Tooke (2001) noted, "The computer affected mathematics education. It changed the mathematics curriculum, the teaching of mathematics, and even the way mathematics was learned" (p. 1). But investigating the effects of computer-based multimedia on learning and performance requires a solid foundation in cognitive psychology and learning theory (Carver & Klahr; 2001; Mayer, 2001, 2005).

Koenraad Kuiper, Colin McMurtrie, Gregor Ronald (2005), *E-lectures within an integrated multimedia course design*. Course design should be student-centred in that courses are designed for students. But the consequences of that imperative differ from course to course and from student to student. This paper describes two courses that take student-centredness seriously. It also contextualises the way in which these courses are presented. Since students have different cognitive and affective styles and different social and personal backgrounds and approaches, a variety of presentational approaches are outlined which are integrated in each course. The courses are presented traditionally in lectures, practical workshops, and tutorials, but also in a textbook, downloadable PowerPoint slides, and, innovatively, as QuickTime movies in which the PowerPoint is integrated with a voiceover from the lecture. Online quizzes and surveys are also provided so that students can receive feedback on their progress and on communal views.

Luiza De Sousa, Barry Richter, Carisma Nel (2017), in the case study, *The effect of multimedia use on the teaching and learning of Social Sciences at tertiary level: A case study*, Instructors in higher education are under pressure to provide their students with more effective and efficient learning environments and educational experiences. Instructional systems and educational technology have been receiving great attention from educators in order to enhance students'

learning. Educational technologies such as multimedia presentations are becoming commonplace. The aim of the research reported in this article was to establish which multimedia combinations are best for the teaching and learning of Social Sciences content. A quasi-experimental research design was used to establish how exposure to different multimedia combinations on digital videodisc may affect the achievement of pre-service teachers. The results of the study indicate that when using various multimedia combinations, the unique nature of Social Sciences can be addressed effectively.

King-Dow Su (2008) et al An informative study of integrating multimedia technology into problem-solving for promoting students' abilities in general chemistry, The purpose of this study is to investigate the efficiency of promoting students' problem-solving abilities through multimedia in chemistry teaching. Two classes of undergraduates (n= 85) took participation during the course of this study. The experimental group was taught with multimedia supplementary materials, which include descriptions of conceptual animations for solution process, activity series, and diluted solution. The control group was taught as usual, using a regular chemistry textbook. After three weeks of statistical procedure with the analysis of ANCOVA, it was found that the experimental group students outperformed their counterparts in the conceptual problem-solving ability, the results revealing that the students benefited from the development of chemical concepts. The results show that there are four advantages for this study:(1) The groups were similar in terms of chemistry achievement as assessed by the report of the pretest for the experimental group and control group, and there was no significant difference in the t-test.(2) The experimental group received significantly higher conceptual understanding scores on the posttest than the control group did.(3) An ANCOVA result of three conceptual tests and total posttest appeared that two groups made a significant difference on conceptual problem-solving ability, where $F= 18.348, P < 0.001$; $F= 32.506, P < 0.001$; $F= 16.075, P < 0.001$; and $F= 86.485, P < 0.001$, stand for Q1, Q2, Q3, and total posttest respectively.(4) Students received traditional instruction to use static visuals that were not successful at solving the misconceptions in chemistry. The fruitful result of integrating animations into science teaching in this article is reaffirmed in the experimental group. At the end of this study, of incorporating multimedia into chemistry teaching turns out to be an effective validated.

Annette Marie Burden (2002), studied Teaching survey of mathematics at the university level: An integrated multimedia approach, In the last few decades, many innovative multimedia technologies such as compact disks (CDs), digital cameras/camcorders, virtual reality simulators, and digital synthesizers have become available for use. Educators have recognized that these technologies could be used as potential enhancements to both the teaching and learning experiences. Many of these technologies have been successfully integrated into various areas in education; however, it was difficult to find any research to substantiate a fully successful integration of this technology into the field of mathematics from the aspects of both teaching and learning. This implementation project was an attempt to fill that void.

Diana Laurillard (1995), *Multimedia and the changing experience of the learner*, This paper argues for a pedagogical analysis of what the new multimedia systems can offer that will impose on them a more ambitious objective than they currently have. It begins by summarising a framework for analysing educational media, in terms of how well they each support the teaching-learning process. The different types of media are then related to different 'modes' of learning: via the narrative media which support learning through acquisition, the discursive media which support learning through discussion, the interactive media, which support learning by discovery, and adaptive media which can be used to support 'guided discovery'. Multimedia is sometimes seen as a way of re-purposing material originally developed for narrative media. Because it can be (even should be) an adaptive medium, this requires the learning objectives to be re-constructed if the new medium is to achieve its pedagogical potential and offer a new kind of learning experience to students.

Kokom Komalasari, Didin Saripudin (2017) in the study, *Value-Based Interactive Multimedia Development through Integrated Practice for the Formation of Students' Character* says that, This study aims to describe the development of value-based interactive multimedia through integrated practice for the formation of students' character. This study uses Research and Development Design at the Department of Social Sciences Education at Indonesia University of Education. Conceptually, the design in question is integration of living values and social studies learning

materials into interactive multimedia by involving students through an integrated practice in schools (university and junior high school). Implementation of the design is realized through several steps: negotiation of subject matter and character, presentation of materials, group distribution based on social science topics, exploration of character values according to the topics, integrated practice (initial observation to school, multimedia scenario development, multimedia production, multimedia simulations in class, and multimedia utilization in school). Implementation of the interactive multimedia design.

Gabriel Janvier Tuginshuti, Leon Rugema Mugabo, Alexis Banuza (2021), Integrating video-based multimedia in teaching physics in context of Covid-19 in Rwandan secondary schools, The Covid-19 pandemic has paralyzed the education system and lead to temporary school closure. After school re-opening, long-term responses to a resilient education system were needed. A descriptive survey research design was used to diagnose the barriers to video-based multimedia integration in teaching and learning physics in certain secondary schools. 47 physics teachers (35 males and 12 females) were purposely selected from 24 schools located in the Rutsiro and Rubavu districts. A questionnaire was given to all 47 teachers. One-on-one interview with great attention to the measures of reducing the transmission of Covid-19 was conducted to all senior five physics teachers. Research findings revealed that video-based multimedia is less used in teaching and learning physics. Teachers indicated that poor infrastructure, poor teachers' training aimed at effective integration of multimedia in education, pressure to prepare students for exams, and teachers' lack of time for preparation are major factors that impede the use of video-based multimedia in teaching and learning physics. Results also provided proof of the necessity to provide digital devices to teachers and learners, teachers' training, and learners' preparation for virtual classes so that video-based multimedia could be a better instructional strategy to long-term responses for Covid-19 and future shocks. The findings of this study revealed that VBM could be a consensus on education and technology competency required to support teaching and learning especially during Covid-19 and future shocks.

Dikmenli and Unaldi (2013) conducted an investigation on the effect that the mixed learning environment and the virtual classroom application had on students' academic performance and attitudes about the geography course. This was done in comparison to the face-to-face expository

technique, which is considered to be the typical teaching approach. The results suggested that, when compared to the face-to-face expository approach, blended teaching methods and virtual classroom practices had a statistically significant influence on students' performance in geography and attitudes towards the subject. This was the case when comparing blended teaching methods and virtual classroom practices to the face-to-face expository technique. However, the methods that were used did not significantly contribute to it because the students' attitudes toward the geography course were high at the beginning and end of the experiment in both the control group and the experimental group. This was the case regardless of which methods were used.

Gábor Sziebig, István Nagy, Rafael Kalman Jardaán, Péter Korondi (2008), Integrated multimedia educational program of a DC servo system for distant learning, The paper presents a complete (animation, simulation and internet based measurement) multimedia educational program of DC servo system for distant learning. The animation program describes the basic operation of a DC motor, derives the torque-speed characteristics and explains the basic steps of control design. The animation program includes screens for teaching in class and for individual study as well. With the guidance of this animation program the students can simulate the control of a given servo system. The final and most important step in any kind of education in the field engineering is the measurement. This is the most challenging step in distant learning. The students should enter to a web page to access the experimental set up. The experimental set up includes a DC servo motor with 4 quadrant drive. The drive can be switch on and off via internet. The students can write a simple PI or sliding mode controller program which is inserted into the communication frame program to operate the servo motor. The measurement result is generated in such form which is compatible to the simulation results the students can compare their simulation and measurement results.

Keqin Lu, (2020) studied that, The further integration of information technology and subject teaching is the megatrends of teaching reform nowadays. With the help of information technology, teachers, learners and teaching environment have been effectively integrated; the enthusiasm of teachers and students in learning has been greatly improved. However, the actual effect of foreign

language learning has not been substantially improved. Instead, they have become optional outside the classroom. How to use the existing equipment and resources to build a personalized learning environment acceptable to learners and can improve the results of learning is a problem that our English teachers should consider. In view of the rationality of constructivism and contextual cognitive theory in supporting individualized classroom learning, combining with the above theory, based on MMFU (Multimedia for You), this paper attempts to realize it in classroom learning through the application case analysis of foreign language learning with the method of materialization and humanization

Yang Shu (2020), et al, in practical English teaching, the level of multimedia application of teachers is uneven, and it is not completely clear about the integration meaning, integration methods, and integration strategies of multimedia and curriculum teaching. There are also many problems that need to be solved urgently in teaching. This paper uses English translation for the application of computer multimedia-assisted teaching, and uses multimedia resources, online translation software, and online English translation tests to fully mobilize students' interest in learning. The use of multimedia-assisted teaching resources is to create a real English learning environment for students, focusing on strengthening the training of college English translation, so that students really feel the standard English translation and grammar knowledge. This provides a reference for the construction of English teaching network. Practice has proved that the application of task-based language teaching method in English multimedia translation classroom teaching has significant advantages. It combines the advantages of modern multimedia technology and task-based language teaching method. It integrates multimedia courseware, teachers and students through a series of tasks, forming a dynamic teaching model. It is advisable to optimize college English multimedia classroom teaching and improve students' language awareness and ability.

You-g Chen, Deyi Kong (2016), in the study “An investigation on factors in the integration of reciprocal teaching into multimedia teaching”, states that, The popularity of the Internet has toppled people’s thinking models and teaching styles as well as influenced the operation of school education. In teaching processes, computers could attract students’ attention through vivid images,

bright colors and characters, and sound to further promote their learning concentration and interests. Research on the application of integrating information into instruction is increasing, and lots of studies prove that technology could help students' learning and improve their learning attitudes.

Tzu-Hua Wang, Chien-Hui Kao, Yu-Ling Dai (2019), presented a study that developed a web-based multimedia assessment system (WMA system) and applied it to science laboratory instruction. The goal was to improve students' knowledge acquisition under science laboratory instruction. The developed system enabled learners to perform self-assessments by responding to multimedia technology test items online. The system recorded each learner's complete answer history and provided the students with personalized learning resources. This study adopted a quasi-experimental research design. The learning content was an "experiment on separating mixtures." Students participating in the research were divided into a typical science laboratory instruction group (TI group; n = 25) and a group that received instruction through the WMA system (WMA group; n = 26). Before instruction, all the students completed the conceptual knowledge and experimental knowledge pretests. During instruction, the TI group watched the teacher's demonstration experiment, and the students then performed the experiment in a real laboratory. In the WMA group, after learning through the WMA system, the students also performed the experiment in a real laboratory. After instruction, all the students completed the conceptual knowledge and experimental knowledge posttests. The findings indicated that the students in the WMA group showed significantly higher improvements in their scientific conceptual knowledge and experimental knowledge.

Adenan Ayob (2018), investigated that In this new era of information and communication technology, one great mission shows that pedagogy and multimedia integration system model contributes to the development of innovative teaching materials. From that mission, researcher was trying to carry out related research. Thus, this research was conducted to review student's achievement in essay writing before and after exposed to integration system model. Quasi-

experimental method was used to review the mean difference before and after the students was exposed to the system model. The sample is 30 standard five primary students in the Federal Territory, Kuala Lumpur, Malaysia. The sample is an intact group that was determined by the school. The descriptive data are mean and standard deviation, while the inferential data is Paired Samples T Test. The results showed that there was significant difference between pre-test and post-test. As a conclusion, the Ministry of Education, Malaysia has to create a comprehensive pedagogy and multimedia integration system model in the classroom in all states in Malaysia. It aims to activate the information technology implementation in the classroom. In terms of implication, this study can generate innovation in system model for teaching in the classroom too.

SS Bhakti, AH Setyadin, SR Hidayat, A Zulfikar, NJ Fratiwi, SA Amalia, DS Jubaedah, FN Sholihat, N Afif, DT Chandra, P Siahaan, E Suhendi, I Kaniawati, A Samsudin (2019). The purpose of this study was to know about the solar system is one of the intangible learning materials of science because the phenomena that occur could not be presented directly in the classroom such as members of the solar system, the repetition of day and night, the phases of moon, and the eclipse. This resulted is student difficulties to understanding the solar system concept. To overcome these problems, the researcher aims to develop learning media that can also enhance the Critical Thinking Skills (CTS) of students through Multimedia Based Integrated Instruction (MBI 2). MBI 2 is an integrated multimedia computer which contains learning materials including video, animation and simulation, learning tools, e-books and assessment. To collect and analyze the data genuinely and comprehensively, researchers utilized a pre-experimental method with one group pretest-posttest design for 36 students as research subject. The results of research showed that (1) 43% of students were able to identifying/formulating the criteria of possible answers,(2) 32% of students could giving a reason,(3) 39% of students could giving a hypothesis,(4) 41% students could identifying assumptions or conclusions,(5) 36% of students could select the possible criteria as a solution to the problems. Based on data analysis, it can be concluded that MBI 2 could significantly enhance the critical thinking skills of junior high school students on solar system.

Richard E Mayer (2008), 's study, "Applying the science of learning: evidence-based principles for the design of multimedia instruction," During the last 100 years, a major accomplishment of psychology has been the development of a science of learning aimed at understanding how people learn. In attempting to apply the science of learning, a central challenge of psychology and education is the development of a science of instruction aimed at understanding how to present material in ways that help people learn. The author provides an overview of how the design of multimedia instruction can be informed by the science of learning and the science of instruction, which yields 10 principles of multimedia instructional design that are grounded in theory and based on evidence. Overall, the relationship between the science of learning and the science of instruction is reciprocal.

Kuan-Hung Chen (2018), Effects of multimedia teaching integrated social story on autistic children's social interaction, in the research most autistic students suffer from the problems of social interaction and interpersonal communication, and most teachers and peers do not know how to get along with their special and irrational behaviors and limited communication methods. Some autistic students could present interests and motivation on interpersonal interaction and are proactive, but it becomes the one-way and age-unmatched weird performance. Assisting autistic students in adapting to school life, enhancing appropriate interactive behaviors, and reducing improper social interaction are the challenges for teachers. Nonequivalent pretest posttest control group design is utilized in this study for the quasi-experimental research. Total 72 students in two classes of a special education school in Fujian Province are selected as the research subjects. The research results reveal (1) significant effect of multimedia teaching on social interaction, (2) remarkable effects of Social Story on social interaction, and (3) the optimal effect of multimedia teaching on the promotion of social interaction with Social Story. Finally, suggestions, according to the results, are proposed, expecting to help autistic students survive in the environment, appropriately interact with people, and effectively enhance the training of social interaction.

Yuliang Liu, (2013), This quasi-experimental study was to design, develop, and implement one multimedia math lesson in third grade to improve students' math learning. The non-equivalent

control group design was used. The experimental group had 11 third grade students and the control group had 15 third grade students in an african american predominated elementary school in the midwest of uSa. The independent variable was the multimedia math lesson and the dependent variable was students' math performance. it was hypothesized that the (a) teacher and students scored favorably about the multimedia math lesson,(b) students were very attentive to multimedia math instruction, and (c) the students scored statistically higher on the posttest at the end of the intervention in the experimental group than in the control group. The findings have theoretical and practical international implications for K-12 education.

Multimedia refers to the integration of different media such as text, graphics, animation, sound, video (digital or analog), imaging, and spatial modeling into a computer system where appropriate (Jonasses, 2000). according to Bork (1992), a multimedia learning environment is a new paradigm for learning in current education. This is especially true for mathematics learning. Tooke (2001) noted. The computer affected mathematics education. it changed the mathematics curriculum, the teaching of mathematics, and even the way mathematics was learned”(p. 1). But investigating the effects of computer-based multimedia on learning and performance requires a solid foundation in cognitive psychology and learning theory (Carver & Klahr; 2001; Mayer, 2001, 2005).

William S Harwood, Maureen M McMahon (1997), et al, this study explored the effects of an integrated video media curriculum enhancement on students' achievement and attitudes in a first-year general high school chemistry course within a multiculturally diverse metropolitan school district. Through the use of a treatment-control experimental design, approximately 450 students in Grades 9–12 were sampled on measures of chemistry achievement and attitude over the period of 1 academic year. The results revealed significantly higher achievement scores on standardized measures of achievement as well as on microunit researcher-designed, criterion-referenced quizzes for the treatment students who experienced a general chemistry course enhanced with an integrated use of a structured chemistry video series. Correlation of student achievement with logical thinking ability revealed that students with high levels of logical thinking ability benefited most from the video-enhanced curriculum. Treatment students also scored significantly higher than control students on the chemistry attitude instrument. These results along with qualitative supportive evidence suggest that this integrated video media curriculum intervention can positively affect

student chemistry achievement and attitude across ability levels and across a diverse multicultural population. Furthermore, the data suggest that educational science video media in general, and the World of Chemistry video series in particular, are instructional tools that can be used effectively to bring the often abstract, distant worlds of science into close focus and within the personal meaningful realm of each individual student. © 1997 John Wiley & Sons, Inc. *J Res Sci Teach* 34: 617–631, 1997.

2.7 conclusion

The investigator was able to obtain a comprehensive understanding of the research topic and its key components, as well as information on what has previously been done in the chosen field and what needs to be done in light of the problem, as a result of the study of related literature. This was possible because the investigator was able to obtain a thorough understanding of the research topic and its key components. The study has been helpful in highlighting the urgent requirement of developing a Integrated multimedia method and assessing the influence that such an approach will have on boosting achievement and attitudes among students in secondary schools. Students may experience higher levels of success and progress in the teaching and learning process as a direct consequence of education that is more concentrated. In the event that educational institutions do not adapt to the changing times, competitors who are more willing and competent to do so will overtake them.

Integrated multimedia method was shown to be better than conventional approaches in terms of academic accomplishment across a variety of subject areas as well as the development of student attitudes and views of mixed learning, according to a review of research that were relevant to the issue. In terms of academic achievement, one research found that blended learning performed much better than traditional classroom education. The researcher discovered via an analysis of the relevant literature that no studies had been conducted to investigate how blended learning influenced the academic performance of secondary school pupils or their attitudes about learning. There are unquestionably obstacles to overcome for educational establishments that are making the switch to virtual and integrated multimedia learning. On the other hand, the benefits are substantial. Learning that is more personalised and tailored to the needs of each student is likely to result in increased student engagement. Students who are more involved in their studies are more likely to achieve academic success and to continue their education.

METHODOLOGY

CHAPTER – 3

METHODOLOGY

3.1 INTRODUCTION

Research methodology involves the systematic procedure by which the researcher starts from the initial identification of the problem to this conclusion. The role of the methodology is to carry on the research work in a scientific and valid manner. The methodology consists of procedure and technique for conducting study. The researcher must learn the proper use of research method. Thus, research methodology consists of all general and specific activities of research. Mastery of the research methodology invariably enhances understanding of the research activities. Research methodology is a way to solve the research problem systematically. When we talk about research methodology, we not only talk of research methods but also consider the logic behind the methods we use in the context of our research study.

In this chapter, the investigator discussed the method adopted, area of study, population, sample of the population, sampling technique, and instrument for data collection, administration of the instrument and method of data analysis.

3.2 METHOD ADOPTED IN THE PRESENT STUDY

In this present study experimental method was used to collect data. The students were divided into two non – equivalent groups namely control group and experimental group. The control group students receive the content through conventional method of teaching. The experimental group of students received the content through PowerPoint presentation, images and videos. Pre test and post test were conducted by the investigator. Both the pre test and post test question paper were prepared by the investigator. Pre test question paper was used to test the previous knowledge of the students in the content. After diagnosing the previous knowledge teaching was done separately to the two non – equivalent groups using conventional method to one group and integrated multimedia method to the next group. Later post test was conducted and the scores were tabulated, analysed and interpreted.

3.3 STUDY LOCALITY

The present study was undertaken in a rural area Pattiveeranpatti. Pattiveeranpatti has 5 schools in their locality. The schools are governed by the committee nominated by H. N. U. P. Sangam. They are so called as N. S. V. V. Group of Schools. Among the 5 schools 4 are government aided school and one is private. The present study was conducted in that private school. The investigator selected sample from VII standard students belonging to N.S.V.V. Matriculation Higher Secondary School, Pattiveeranpatti.

3.3.1 ABOUT THE SCHOOL

The school is basically a co – educational institute. The learning opportunities are provided well. They motivate the students in the right path with correct reinforcement and material rewards. The students are well disciplined. They are always ready to took part in any kind of activities. The students obey the rules and regulations laid by the school committee. Following are the characteristics of the school.

- The N. S. V. V. Matriculation school was founded by the H. N. U. P. Sangam in **1984**.
- The motto of the N. S. V. V. Group of Schools is “**Knowledge is Power**”
- The motto of the N. S. V. V. Matric. Hr. Sec. School is “**Learning together succeeding together**”
- This co-educational institution offers instruction through English
- Co-curricular and extracurricular activities are initiated through various activities

3.4 SAMPLE

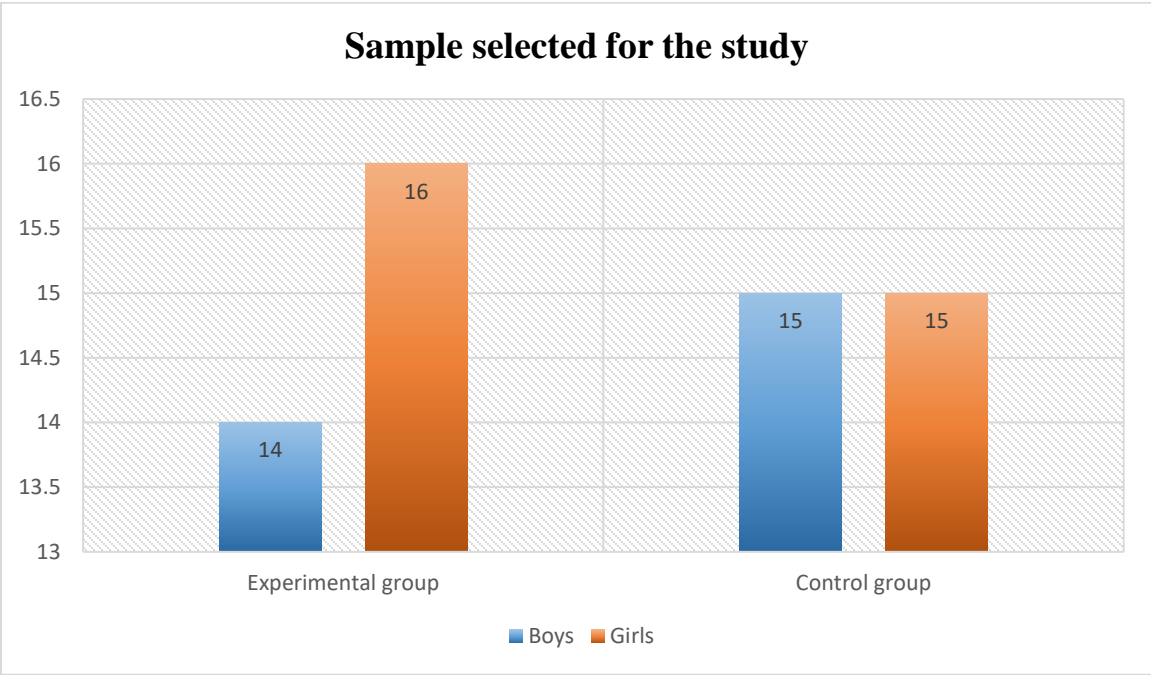
Purposive sampling technique was used to select the sample for collecting data. It is the basis for other types of probability sampling. In this method of selection, every item has an equal chance to be selected. The overall strength of the school is 1800.

3.4.1 SAMPLE SELECTION

Among 1800 students from KG to XII standard students the investigator selected 60 students from class VII. The class VII – A was selected as experimental group and class VII – B was selected as control group

S. NO	NAME OF THE SCHOOL	GROUP	NO. OF CHILDREN		TOTAL
			BOYS	GIRLS	
1.	N.S.V.V. Matriculation Higher Secondary School				
		Experimental group	14	16	30
		Control group	15	15	30

Table 3.1 Sample selected for the study



Graph 3.1 sample selected for the study

3.5 TOOLS USED IN THE STUDY

The success of a research study depends mostly on the nature of the tools and techniques used. Different types of tools are used for collecting various information for different purposes. The tool used determines the quality and quantity of the data. "The use of the particular tool depends upon the type of the problem and each research tool is appropriate in a given situation to accomplish a particular purpose" (Best and Khan, 2006)

3.5.1 PERSONAL DATA SHEET

The personal data sheet includes basic information about the sample. The basic information section primarily gathers information such as Name, class, roll number, gender, educational qualification of the parents.

3.5.2 ABOUT THE DATA SHEET

- The pre-test question paper consists of 25 questions
- The post-test question paper consists of 25 questions
- The questions were based on light and its application from the VII standard Tamil Nadu Text Book
- Students can understand the question easily and can answer them according to their opinion.
- The questions were prepared according to the High School Students level.
- The question paper consists of direct questions.
- With the answers provided by the students, investigator can interpret and analyse the data effectively.

3.5.3 ACHIEVEMENT TEST

According to Freeman "Achievement testing is that alternative which measures the knowledge, understanding and skill of a man for specific subject and for various subjects of the curriculum". Achievement test is designed to measure the skills and abilities acquired through

direct intervention or instruction. It can measure both higher and lower order cognitive process of the any individual.

3.5.4. SELECTION OF CONTENT

The investigator selected one unit from science syllabus of VII standard titled “Light” for the preparation of content to be taught through Integrated Multimedia method of teaching for the experimental group of students and conventional method of teaching for control group students. The teaching content was selected from the Tamil Nadu Corporation Textbook. The lesson content used in this investigation was presented in Appendix.

3.5.5. INTEGRATED MULTIMEDIA TEACHING

Integrated Multimedia Teaching is an instructional approach that uses various methods to teach the content. It includes conventional method of teaching done along with some digital strategies in the classroom. The classroom consists of, face – to – face teaching, audios, videos, animation, text and graphics. The class VII – A was selected as experimental group and the light lesson was taught through the integrated multimedia method of teaching

3.5.6. CONVENTIONAL TEACHING

Conventional method of teaching is the common method of teaching used in our classrooms. In this method the instructor or the teacher plays the chief role. Here the students were taught through the lecture method, chalk and talk method. The class VII – B was selected as the control group and the light lesson was taught through conventional method of teaching.

3.6 PRE-TEST QUESTION PAPER

The pre test question paper was prepared and validated by the investigator to check the previous knowledge of the students. The pre – test questions are based on the student’s previous knowledge about light. The pre test was conducted to the experimental group and control group separately to find the previous knowledge of the students.

For the construction of achievement test the investigator prepared a test tool consisting of 25 items for a duration of 60 minutes (Pre-test) The total marks for the test are 25 allotting 1 mark to each item.

S.NO.	PART	NO. OF QUESTIONS
I	Choose the correct answer	10
II	Fill in the blanks	10
III	Match the following	5

Table 3.2 Pre test question paper details

3.7 POST TEST QUESTION PAPER

The post test question paper was prepared and validated by the investigator. The post test question paper is used to analyse the students after teaching the light concept in conventional method for control group and integrated multimedia method to the experimental group. The post – test questions are based on the student’s knowledge about the concept of light given in the text book.

For the construction of achievement test the investigator prepared a test tool consisting of 25 items for a duration of 60 minutes (Post-test) The total marks for the test are 25 allotting 1 mark to each item.

S.NO.	PART	NO. OF QUESTIONS
I	Choose the correct answer	10
II	Fill in the blanks	10
III	True or False	5

Table 3.3 Post test question paper details

3.8. DATA COLLECTION AND ADMINISTRATION OF THE TEST

The investigator personally contacted the selected School. The scope and purpose of the study was explained and permission was sought for collecting the data from the Heads and concerned teachers of the school handling classes for children.

After getting permission from the school the investigator gave pre test to check the previous knowledge of the students for the content the investigator had chosen. After this the investigator used integrated multimedia teaching method to teach the selected unit for Experimental group. The teaching was done with the PowerPoint, videos, audios, animation and graphics. After the teaching, recapitulation was provided by the investigator for the better understanding of the students. Achievement test was conducted by the investigator by distributing the tool. The response sheets were evaluated and the scores were analysed.

The investigator gave pre test to the control group students. Then the selected light lesson was taught through conventional method of teaching. The investigator explains the concept by writing the formulas and difficult words on the black board. The diagrams and equations were

also derived on the black board. Achievement test was conducted to the conventional group of students by the investigator. The response sheets were evaluated and the scores were analysed.

3.8 STATISTICAL ANALYSIS TECHNIQUES USED FOR THE STUDY

Statistical analysis is a powerful technique which is used by the investigator to to make sense of data and check their progress in the research work. Knowing the different statistical analysis methods and know how to use them can help to interpret the data and find the results. The collected data were consolidated tabulated and analyzed statistically by using the following tests:

- Mean, Median and mode
- Standard Deviation
- Test of Significance (t-test)
- Percentage analysis

3.8.1 Mean

The mean is a numerical average for a set of data and is calculated by dividing the sum of the values by the number of values in a dataset. It is used to get an estimate of a large population from the dataset obtained from a sample of the population.

$$\text{Mean} = \frac{\text{Sum of all data}}{\text{Number of data}}$$

3.8.2 Median

The value in the middle (center) of any set of data is called median. In statistics it can be calculated by using the formula.

$$\text{Median} = L + \frac{\frac{N}{2} - cf X C}{f}$$

L = lower limit of the median class

$\frac{N}{2}$ = Half of the total frequency

cf = Cumulative frequency of the proceeding class of the median class

f = frequency of the median class

c = class interval

3.8.3 Mode

The value that appears most frequently in the give data set is called as mode. The set of data contain one mode or more than one mode. Sometimes the set of data will not have one mode at all.

$$\text{Mode} = 3 \text{ Median} - \text{mean}$$

3.8.4 Standard deviation

This technique is used to measure how well the responses align with or deviates from the mean. It describes the degree of consistency within the responses; together with the mean, it provides insight into data sets.

$$s = \sqrt{\frac{\sum(X - \bar{x})}{n - 1}}$$

\mathbf{X} – The value in data distribution $\bar{\mathbf{x}}$ – The sample mean \mathbf{n} – total number

3.11 HYPOTHESIS TESTING

In statistical analysis, when two sets of random variables tested within the data set is known as hypothesis testing. This is also called as “T Testing”. When the test result nullifies the hypothesis, it is called as null hypothesis or hypothesis 0. When anything violates the null hypothesis and it is called as first hypothesis or hypothesis 1.

A t test is used to calculate the exact difference occurs between two means. It used to evaluate the data. The general formula for t test is based on two means and the standard error of the given samples.

$$t = \frac{M1 - M2}{SE}$$

M1 = mean 1 M2 = mean 2 SE = Standard Error

3.9 CONCLUSION

In this chapter, the methodology of the present investigation is explained. A clear-cut view about the method selected, administration of the tool and evaluation of the tool are discussed. Thus, the data obtained was consolidated, analyzed, interpreted and is presented in Chapter IV.

ANALYSIS AND INTERPRETATION

CHAPTER 4

ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

The efficacy of the methodology utilised in the study is evaluated through the analysis of outcomes and the interpretation of data in a suitable and scholarly fashion. The present chapter provides an exposition of the gathered data and the resultant findings. The initial step involves the demonstration of the collected sample scores, which is subsequently followed by a comprehensive analysis. To assess the impact of the research programme, statistical measures are utilised to evaluate values, and the research hypotheses are subjected to testing. This study analyses the four communication skills and teaching methods utilised in the research. Both the control and experimental groups underwent pre-test and post-test assessments, which included all relevant research credentials. The proficiency of students in listening, speaking, reading, and writing is evaluated both prior to and subsequent to instruction utilising a blended approach. A comparison has been made between the current method and the traditional method in terms of their respective outcomes and impacts.

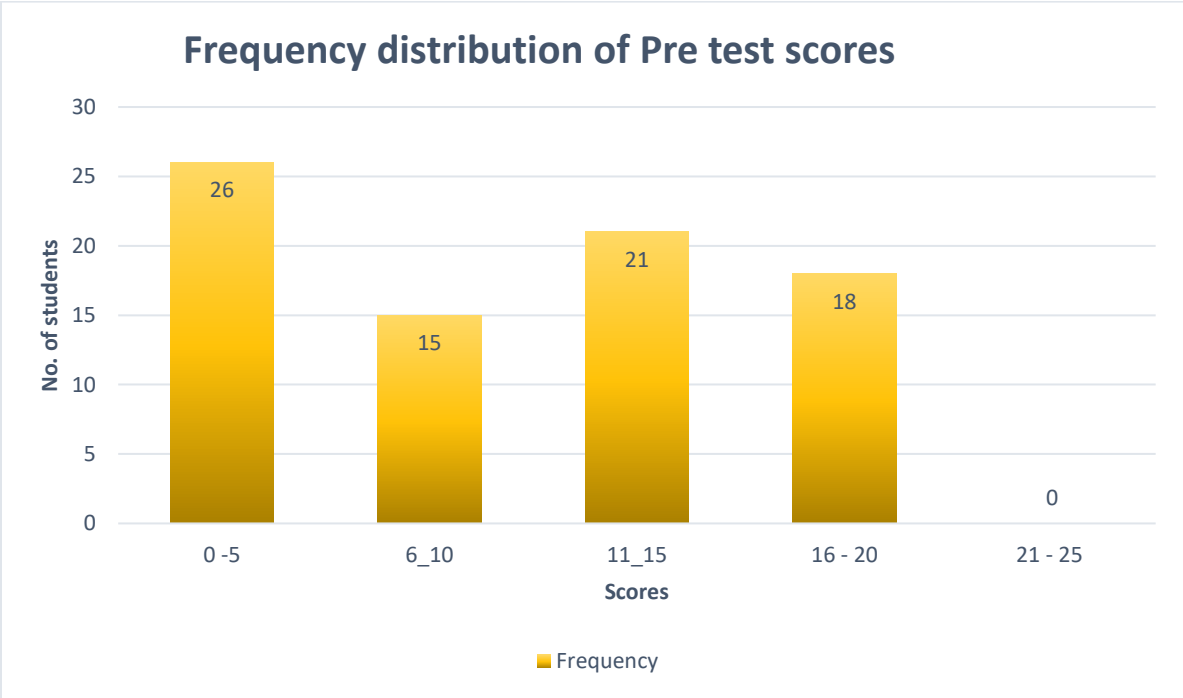
4.2 FREQUENCY DISTRIBUTION OF THE SCORES

The frequency distribution table helps to classify how the values are distributed. They can reveal the facts like highest range to lowest range. It is used for categorical and numerical value. They are marked in the form of class intervals for the better results. Two different frequency tables are given below based on the scores obtained by the students of both experimental group and control group in their pre test and post test.

For the pre test in the below table the highest frequency (26) falls in the 0 – 5 class intervals, the second highest frequency (21) falls in 11 – 15 class intervals. The least frequency (0) falls in 21 – 25 class intervals. From the table it is revealed that majority of the students scored between 0 – 5 range. This shows that many students achieved poor scores in the pre test.

S.NO	SCORE	NO. OF STUDENTS
1.	0 – 5	26
2.	6 -10	15
3.	11 – 15	21
4.	16 – 20	18
5.	21 – 25	0
	TOTAL	60

Table 4.1 Frequency distribution of pre test score

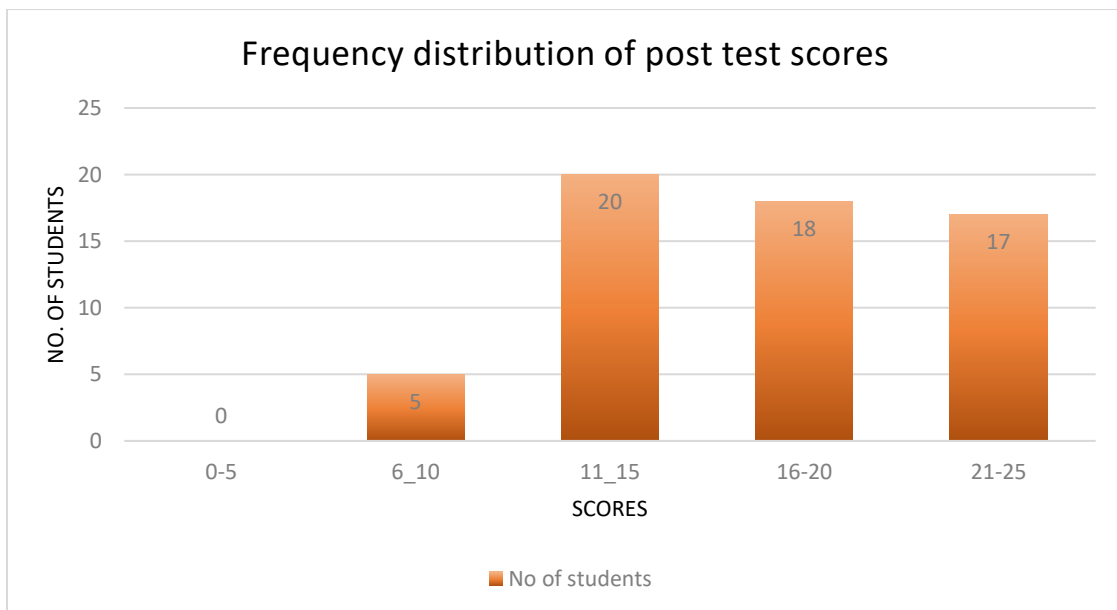


Graph 4.1 Frequency distribution of Pre test scores

For the post test in the below table the highest frequency (20) falls in the 11 – 15 class intervals, the second highest frequency (18) falls in 16 – 20 class intervals. The least frequency (0) falls in 0 – 5 class intervals. From the table it is revealed that majority of the students scored between 11 – 15 range. This shows that many students achieved good scores in the post test.

S.NO	SCORE	NO. OF STUDENTS
1.	0 – 5	0
2.	6 -10	5
3.	11 – 15	20
4.	16 – 20	18
5.	21 – 25	17
	TOTAL	60

Table 4.2 Frequency distribution of post test score



Graph 4.2 Frequency distribution of post test scores

4.2 ACADEMIC ACHIEVEMENT

Achievement can be measured. Academic achievement includes the score obtained by the individual or the group of students in the subjects. It can be either short term or long-term education goal. In the present study the academic achievement test is conducted for the group of students for whom the content is taught through integrated multimedia method of teaching.

S.no		Number	Mean	Median	Mode	SD	Skewness	Kurtosis
1.	Samples	30	17.83	18.5	21	4.1 0	-0.63	- 0.53

Table 4.3 Academic achievement – integrated multimedia method of teaching

The mean score of the total sample is 17.83. The median score is 18.5 and the mode is 21. On seeing the value of skewness, the investigator comes to know that the distribution is negatively skewed, which indicates that the value of mode is maximum and that of mean least, the median lies in between the two.

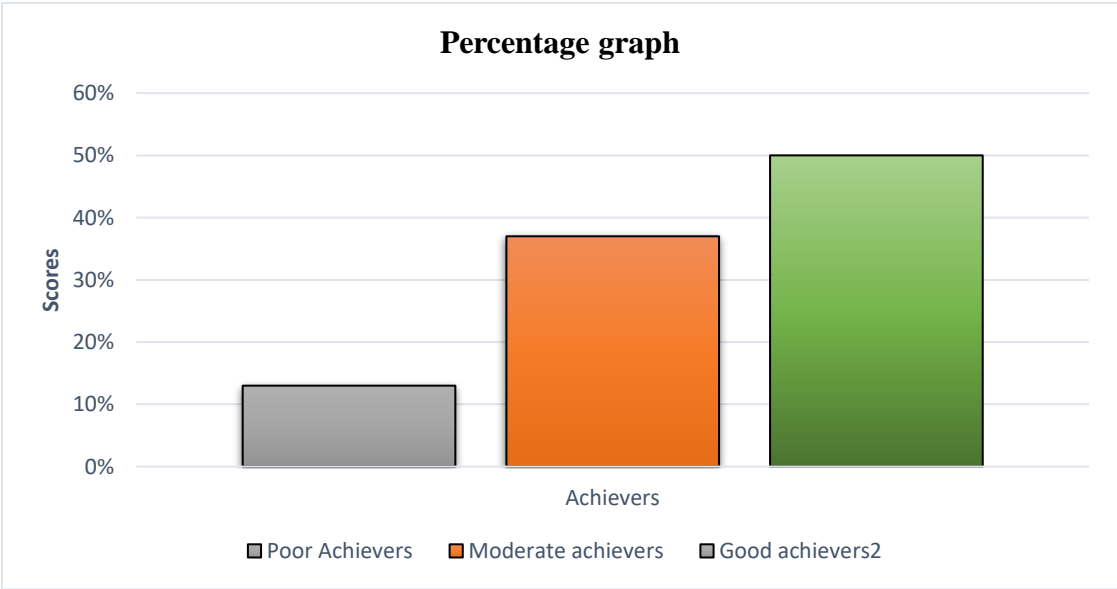
The standard deviation is 4.10. The kurtosis value refers to the flatness of a frequency distribution. In this distribution the value of kurtosis is -0.53, so the curve is platykurtic. Hence the group is homogeneous.

4.2.1 Academic achievement percentage analysis

Academic achievement of the children taught through the integrated multimedia method of teaching is categorized on the basis of their performance in the test conducted by the investigator. Here the achievement test is considered to be the variable.

S.no	Variable	Category	N	%
1.	Academic achievement	Poor achievers (<10)	4	13
2.		Moderate achievers (>10)	11	37
3.		Good achievers (>15)	15	50
		Total	30	100

Table 4.4 Percentage table showing the academic achievement of the student taught through integrated multimedia.



Graph 4.3. Percentage graph showing the academic achievement of the student taught through integrated multimedia.

4.3 COMPARISION OF ACADEMIC ACHIEVEMENT

The comparison between the scores obtained by the students taught through conventional method and through integrated multimedia method is done with the help of “t - test”. For that the mean values and Standard Deviation values were calculated.

S. NO	Total	Scores	Mean	S. D	“t” VALUE
1.	60	Through conventional method	15.03333	4.327007	2.5719*
2.		Through integrated multimedia method	17.83333	4.102845	

*-Significant at 0.05 level

Table 4.5 Comparison of the academic achievement of the students taught through two different methods.

Paired sample t – test was used to find out the difference between the achievement levels of students taught through conventional method and through integrated multimedia method. Calculated t – value is 2.5719 which are found to be significant at 1% level. Therefore, there is significant difference between the two attributes

So, the hypothesis “there is no significant difference between the achievement level of students taught through conventional method and integrated multimedia method” is rejected

4.4 BASED ON GENDER

The table shows the descriptive statistics for two groups, Experimental (VII - A) and Control (VII - B), broken down by gender. In the Experimental group, there were 14 male and 16 female respondents, with a mean age of 15 years and a median age of 15 years for both genders. The standard deviation for male and female respondents in the Experimental group was 1.414213562, indicating a small degree of variability in age within each gender group.

In the Control group, there were 15 male and 15 female respondents. The mean age for both genders was 15 years, and the median age for both genders was also 15 years. The standard deviation for both male and female respondents in the Control group was 0, indicating that there was no variability in age within each gender group. Overall, the data suggests that there is no significant difference in age between the two groups, but there is slightly more variability in age among male and female respondents in the Experimental group compared to the Control group.

Group	Gender	No of respondents	Mean	Median	Standard Deviation
Experimental (VII - A)	Male	14	15	15	1.41
Experimental (VII - A)	Female	16	15	15	1.41
Control (VII - B)	Male	15	15	15	0
Control (VII - B)	Female	15	5	15	0

Table 4.6 Gender based

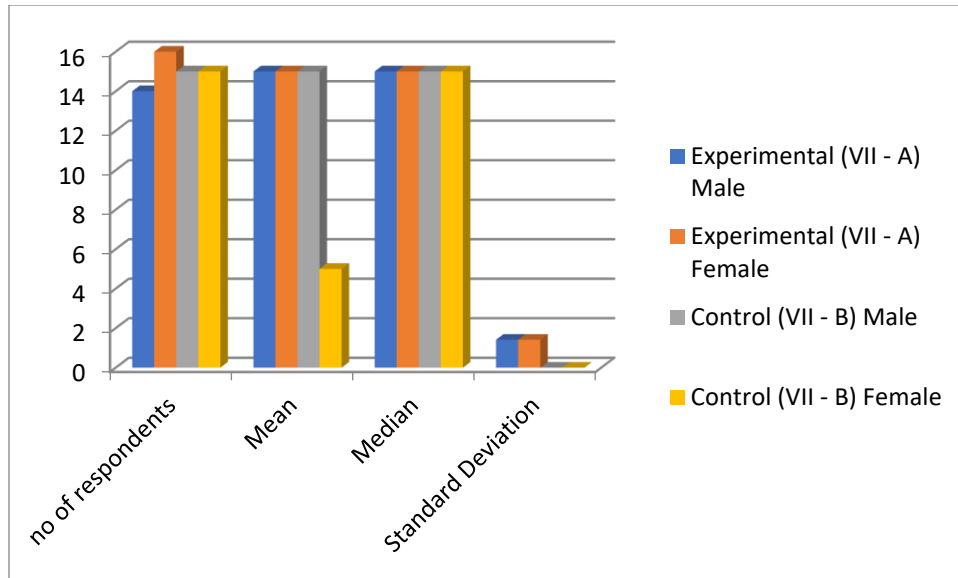


Figure 4.4: Gender of respondents

4.5 IMPACT OF FATHER’S EDUCATIONAL QUALIFICATION

The table shows the distribution of education qualifications of parents in the sample. Out of the total sample size of 30, 14 parents had a school education and 16 parents had a college education. The mean and median education qualification for both groups were 15, indicating that the majority of parents had completed their education until the high school level. The standard deviation for both groups was 0.516, which indicates that there was not much variation in the level of education among parents in the sample. Overall, the data suggests that the majority of parents had a basic education, with slightly more parents having completed college education.

Based on the data provided, the control group has 16 respondents who completed their education till school level, and 14 respondents who completed their education till college level. The mean and median education qualification for both groups are the same, which is 15. The standard deviation for both groups is 0.516, indicating that the data points are relatively close to the mean. Overall, the educational qualifications of the control group seem to be similar to those of the experimental group. Hence the null hypothesis states that “there is no significant influence of father’s education qualification on the academic achievement of the student taught through integrated multimedia” is accepted

	Education Qualification	Count	Mean	Median	Standard Deviation
Control group	School	14	15	15	0.516
	College	16	15	15	0.516
Experimental group	School	16	15	15	0.516
	College	14	15	15	0.516

Table 4.7 Father Education Qualification

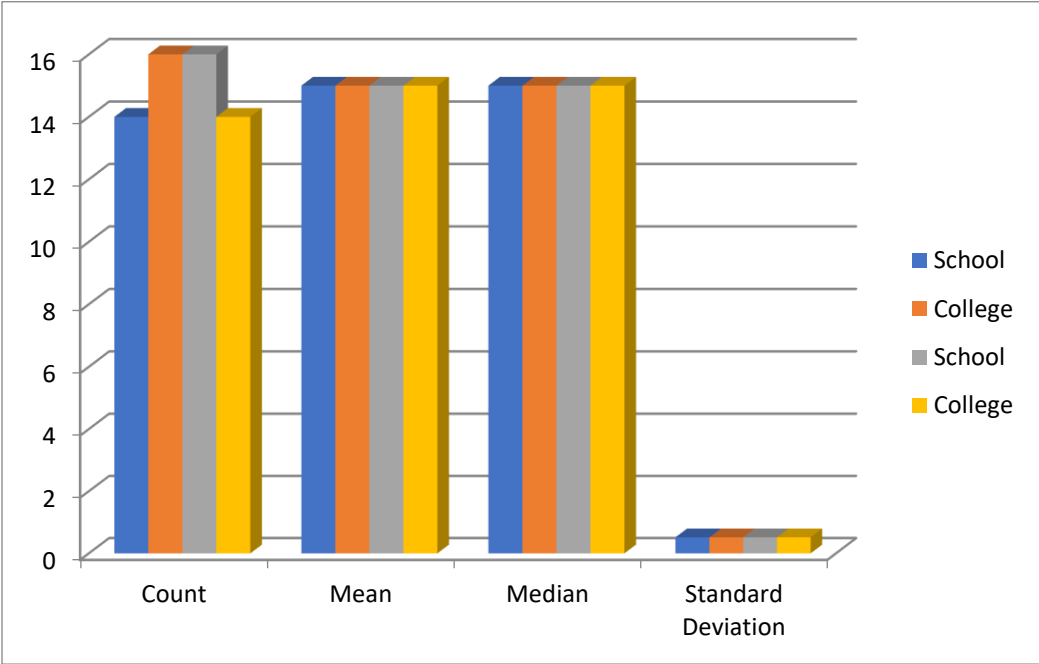


Figure 4.5: Education Qualification of respondents

4.6. IMPACT OF MOTHER’S EDUCATIONAL QUALIFICATION

The table shows that out of the total respondents, 15 had Mother with a School education qualification, while 15 had Mother with a College education qualification. The mean for Mother with School education is 0.5, which indicates that on average, half of the Mother had a School education qualification. The median is also 0.5, indicating that the same number of Mothers had an education level below and above School education. The standard deviation is 0.518, which indicates a moderate degree of variability in the education level of the mothers with School education. For Mother with College education, the mean is also 0.5, which indicates that on average, half of the mothers had a college education qualification. The median is also 0.5, indicating that the same number of Mothers had an education level below and above College education

	Education Qualification	Count	Mean	Median	Standard Deviation
Control group	School	15	0.5	0.5	0.518
	College	15	0.5	0.5	0.518
Experimental group	School	15	0.5	0.5	0.518
	College	15	0.5	0.5	0.518

Table 4.8 Educational qualification the mother

The standard deviation is 0.518, which is the same as the standard deviation for Mothers with School education, indicating a similar degree of variability in the education level of the mothers with college education. the data suggests that in this group of individuals, there is an

equal proportion of Mothers with School and College education qualification, with a moderate degree of variability in their education level. Hence the null hypothesis states that “there is no significant influence of mother’s education qualification on the academic achievement of the student taught through integrated multimedia” is accepted

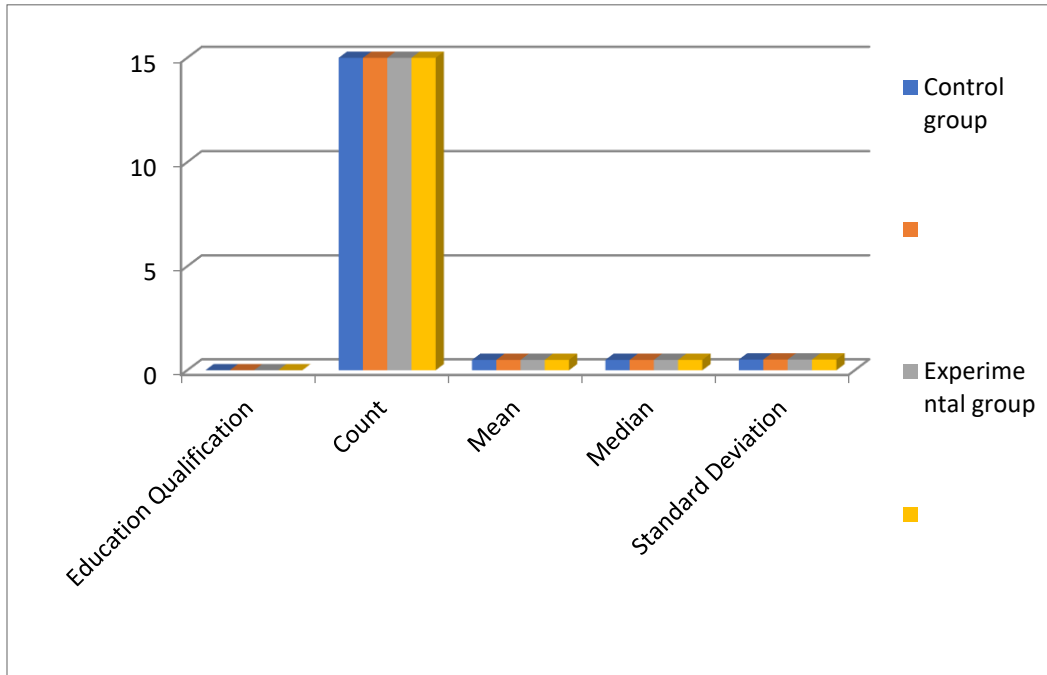


Figure 4.6: Mothers education qualification of respondents

The data provided shows the education qualification of the control group, with 15 respondents each having a school education and a college education. The mean and median of both groups are 0.5, indicating that an equal number of respondents have a school or college education. The standard deviation of 0.518 suggests that the data is not highly dispersed and there is not a significant difference in the education qualifications of the respondents.

4.7 EXAMINATION OF THE HYPOTHESES

The study is guided by hypotheses that have been formulated and tested statistically, in addition to being evaluated subjectively and quantitatively. Three of the five hypotheses are put through quantitative testing, while the other two are put through qualitative scrutiny. In this particular investigation, the paired t test was used for quantitative research, while the frequency

distribution table approach was utilised for qualitative analysis. This particular kind of substantiation laid the groundwork for demonstrating theories.

4.8 A TEST BASED ON MATCHED SAMPLES

By examining and contrasting the scores that were recorded before and after the application of the approach, the paired t test was able to assist in determining whether or not the research was successful in helping students enhance their communication abilities. The sample size for this research is quite low despite the fact that the population being studied is a typical and huge one. In order to determine whether or not there was a connection between the results of the pre-test and the post-test, the researcher employed a paired sample test. The results of both of the examinations follow a normal distribution, and there is a connection between their respective scores. T test of the replies made it feasible to do the study. In this particular investigation, the threshold of significance chosen was 0.05.

4.8.1 Listening skill

Null Hypothesis

Before beginning their education via a mixed technique and after completing the course, there is not a discernible improvement in the pupils' level of listening ability.

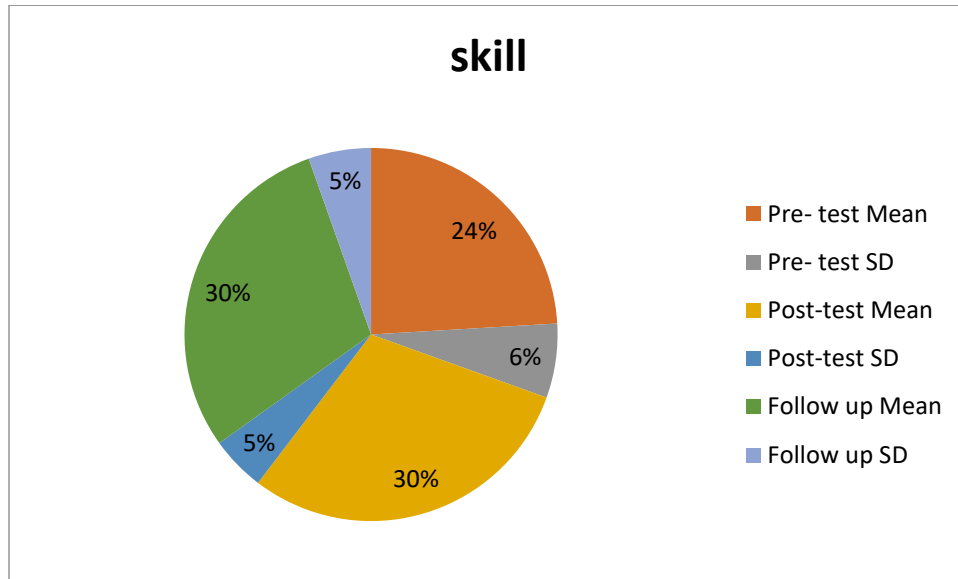
Alternative Hypothesis

Before beginning their education via a mixed technique and after completing the course, there is a discernible improvement in the pupils' level of listening ability.

Variable	N	Pre- test		Post-test		Follow up	
Listening skill	60	Mean	SD	Mean	SD	Mean	SD
		3.5600	.95105	4.4200	.70247	4.3600	.80204

Table 4.9 Mean and Standard Deviation of listening skills

Repeated Measures for Analysis of Variance



Graph 4.7 Percentage of listening skills

Sources of Variation	Variable	Type III sum of Squares	DF	Mean Square	F	“t” value	Sig.
Within group variance error	Listening skill	23.053	1.730	13.326	49.228	2.27	.000

Test after the fact for the pre-test, the test, and the follow-up.

Table 4.10 Within group variance

Variable	Phase (I)	Phase (J)	MD	Sig
Listening skill	Pre-test	Post-test	-.860*	.000
		Follow-up	-.800*	.000
	Post-test	Follow-up	.060	1.000

Table 4.11 Listening skills

*- Significant at 0.05 level

The null hypothesis is not supported since the result that was computed is not higher than the threshold of significance set at 0.05. As a result, there is a discernible improvement in the students' listening abilities after completing the course as compared to before they used the blended approach of instruction. The post-test and follow-up stages demonstrate a significant amount of growth as compared to the first phase. The investigation demonstrates that the blended strategy is effective in enhancing listening ability. The beneficial transformation may be attributed to the consistent practise and exercise of listening that was done. The productive outcome was due in large part to the participation of the participants in the activities that were planned for the session. The pupils in a regular classroom are expected to sit quietly and pay attention, but they are not given many chances to demonstrate their listening ability. The blended strategy provided students with technology-based ways to examine their listening skills and assisted in providing them with frequent feedback.

4.8.2 Speaking skill

Null hypothesis

There is not a discernible change in the students' level of proficiency in speaking either before or after the course, regardless of whether they learned using blended or traditional methods.

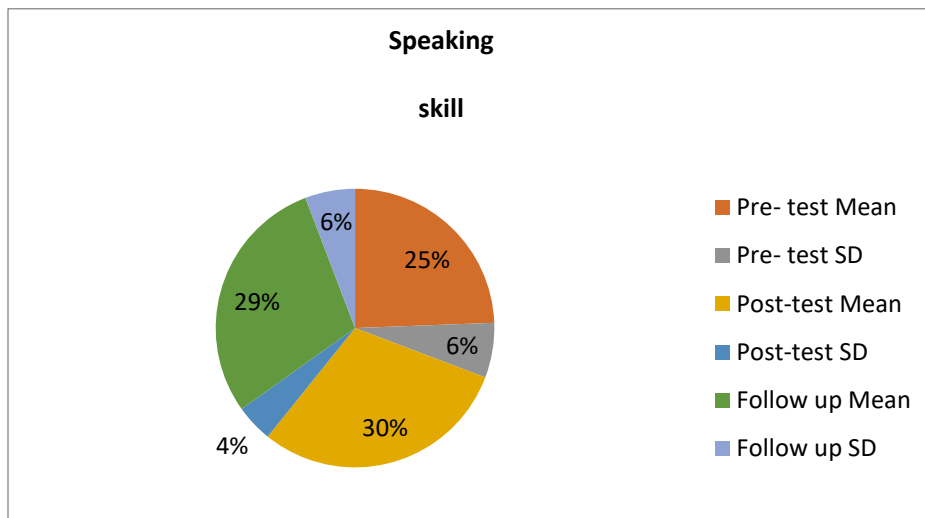
Alternative Hypothesis

After completing the course, students' level of proficiency in speaking is much higher than it was before they started using the blended approach of instruction.

An examination of the responses

Variable	N	Pre- test		Post-test		Follow up	
		Mean	SD	Mean	SD	Mean	SD
Speaking skill	60	3.5600	.92934	4.3800	.63535	4.2400	.84660

Table 4.12 Means and Standard Deviations for pre-test, post-test, and follow-up



Graph 4.8 Percentage of speaking skills

Repeated Measures for ANOVA

Sources of Variation	Variable	Type III sum of Squares	DF	Mean Square	F	t value	Sig
Within group variance error	Speaking skill	19.240	2	9.620	37.078	1.78	.000

Results of the Post-Hoc Test for the Pre-Test, Post-Test, and Follow-Up

Variable	Phase (I)	Phase (J)	MD	Sig
Speaking skill	Pre-test	Post-test	-.820*	.000
		Follow-up	-.680*	.000
	Post-test	Follow-up	.140	.491

*- Significant at 0.05level

Table 4.13 Speaking skills

The null hypothesis is not supported since the result that was computed is not higher than the threshold of significance set at 0.05. Because of this, there is a discernible change in the level of speaking ability possessed by students before they began studying using a blended technique and after they completed the course. The investigation confirms that the blended strategy is beneficial to the improvement of speaking ability. The blended technique, in comparison to regular sessions, gives students more opportunities to connect and talk, which in turn improves their ability to communicate verbally. Extemporaneous speaking, subject presentations, and debates were some of the more common events, and the researcher made sure that every student took part. The trainees and the teacher made a concerted effort to practise their public speaking skills, and the results demonstrated significant growth in their self-assurance to address an audience. During the pre-test, the method that was used was centred on the teacher, and students were not given sufficient opportunities to speak. Because to a number of constraints, activities within the classroom were severely restricted. The blended system allowed for more time to be spent studying, and students were given more latitude to engage with one another.

4.8.3 Reading Ability

Null Hypothesis

There is not a discernible change in the students' reading ability either before or after they took the course, regardless of whether they learned using blended or traditional methods.

Alternative Hypothesis

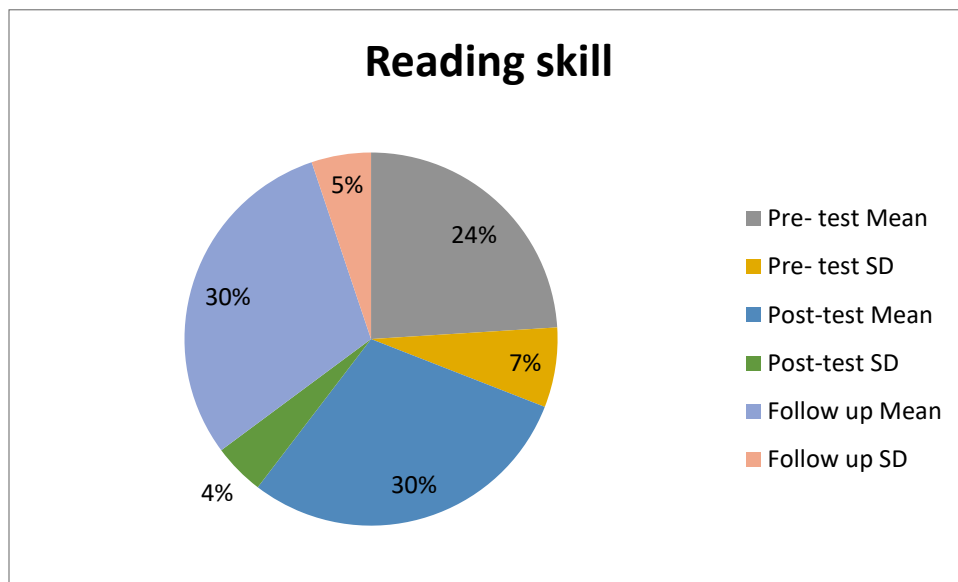
Between the beginning of their experience with blended learning and the end of the course, there is a discernible improvement in the students' level of reading ability.

An examination of the responses

Table comparing pre-test, post-test, and follow-up means and standard deviations

Variable	N	Pre- test		Post-test		Follow up	
		Mean	SD	Mean	SD	Mean	SD
Reading skill	60	3.5200	1.01499	4.3200	.65278	4.4000	.75593

Table 4.14 Mean and Standard Deviation of Reading Skills



Graph 4.9 Percentage of Reading Skills

Repeated Measures of ANOVA

Sources of Variation	Variable	Type III sum of Squares	DF	Mean Square	F	“t” value	Sig
Within group variance error	Reading skill	23.680	1.582	14.967	26.580	4.87	.000

Results of the Post-Hoc Test for the Pre-Test, Post-Test, and Follow-Up

Table 4.15 Within group variance error

Variable	Phase (I)	Phase (J)	MD	Sig
Reading skill	Pre-test	Post-test	-.800*	.000
		Follow-up	-.880*	.000
	Post-test	Follow-up	-.080	1.000

*- Significant at 0.05level

Table 4.16 Reading skills

The null hypothesis is not supported since the result that was computed is not higher than the threshold of significance set at 0.05. Because of this, there is a discernible change in the reading ability of students after completing the course as compared to before they used the blended approach of instruction. According to the findings of the study, using a mixed approach does aid to increase reading ability. Reading resources, both online and offline, as well as exhaustive and discursive activities, allow a more concentrated attention on reading ability and aid its improvement. A general reading habit is also encouraged, and conversations on a variety of literary genres produced interest and made learners excited. This is in addition to the study materials that are provided. The standard method of instruction in the classroom involves correcting reading comprehension exercises, which is a laborious activity since it takes a lot of time. This process

was made much easier by the availability of online platforms, which also gave pupils the chance to practise as often as they wanted till, they were happy. The new approach clearly resulted in increased happiness and growth among the students.

4.8.4 Writing Abilities

Null Hypothesis

Before beginning their education using a blended technique and after completing the course, there is not a discernible improvement in the students' level of writing ability.

Alternative Hypothesis

Before beginning their education via a blended technique and after completing the course, there is a discernible and substantial improvement in the students' level of writing ability.

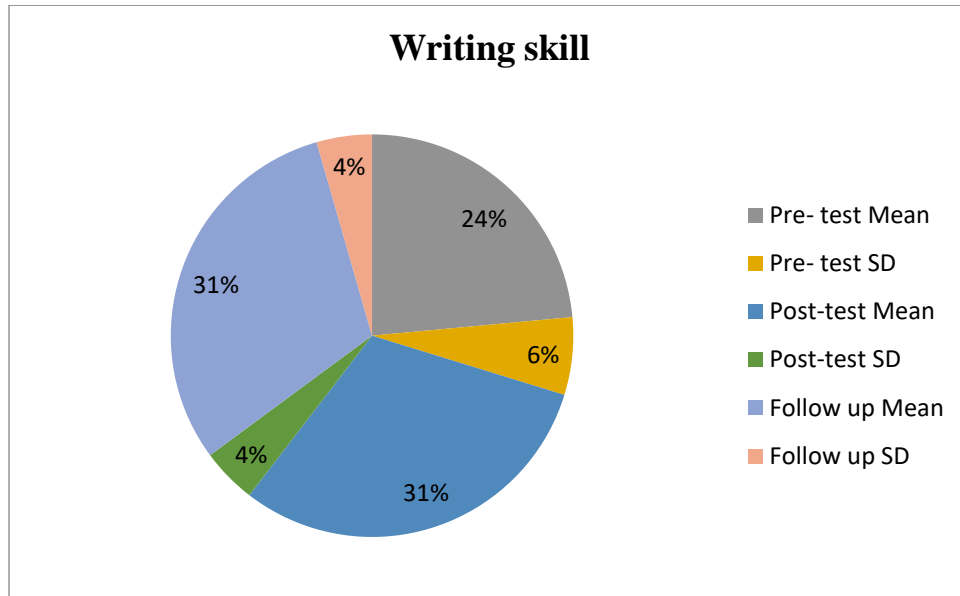
An examination of the responses

Table comparing pre-test, post-test, and follow-up means and standard deviations

Variable	N	Pre- test		Post-test		Follow up	
Writing skill	60	Mean	SD	Mean	SD	Mean	SD
		3.4200	.90554	4.4600	.64555	4.4600	.64555

Table 4.17 Mean and Standard Deviation of Writing skills

Repeated Measures of ANOVA



Graph 4.10 Percentage of Writing Skills

Sources of Variation	Variable	Type III sum of Squares	DF	Mean Square	F	“t” value	Sig
Within group variance error	Writing skill	30.453	2	15.227	50.504	3.16	.000

Results of the Post-Hoc Test for the Pre-Test, Post-Test, and Follow-Up

Table 4.18 Within group variance error

Variable	Phase (I)	Phase (J)	MD	Sig
Writing skill	Pre-test	Post-test	-1.040*	.000
		Follow-up	-.840*	.000
	Post-test	Follow-up	.200	.120

*- Significant at 0.05level

Table 4.19 Writing skills

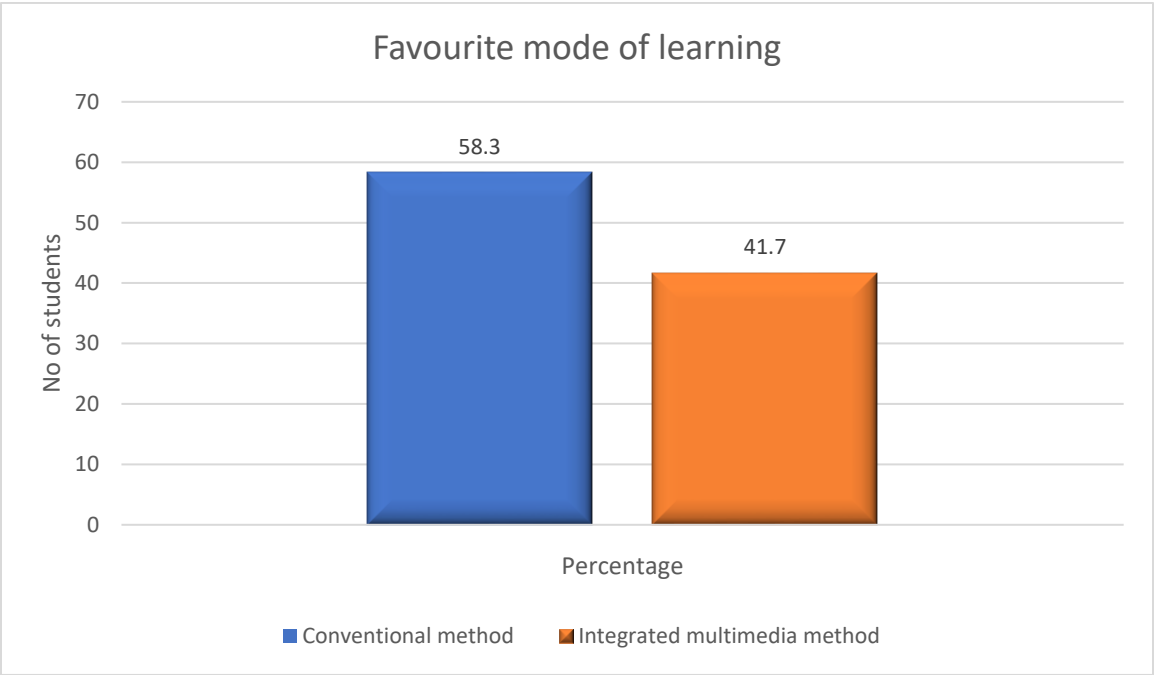
The null hypothesis is not supported since the result that was computed is not higher than the threshold of significance set at 0.05. Because of this, there is a discernible change in the level of writing ability possessed by students before they began studying via a blended technique and after they completed the course. According to the findings of the investigation, the blended technique is beneficial to the development of writing ability. Writing skill training that consists of repeated practise along with correction has been shown to be beneficial. Writing assignments were handed out online more often than in the classroom because personalised attention is provided via the use of learning websites. The effectiveness of correction and feedback provided by a peer group was shown. It was found that giving students regular writing tasks and then requiring them to redo or alter their work after receiving feedback was beneficial. In the course of the research, we used a blended method, which included this strategy.

4.9 FAVORITE MODE OF LEARNING

The favorite mode of learning changes according to the learner's ability. The learners are of various type like auditory learners, visual learners and kinesthetic learners. So, the method of teaching is very important in this teaching learning process. In this present study two methods of teachings were used that is conventional method and integrated. The students were asked to choose which method is favourite for them. From that the below table shows that out of total respondents, 35 had chosen conventional method of teaching, while 25 had chosen integrated multimedia method of teaching.

S.no	Favourite mode of learning	N	%
1.	Conventional method	35	58.3
2.	Integrated method	25	41.7
		60	100

Table 4.20 Percentage – Favourite mode of learning



Graph 4.11 Percentage – favourite mode of learning

The favourite mode of learning for the students is analysed by percentage analysis method. 58.3% of students opted for conventional method and 41.7% students selected the Integrated multimedia method as their favourite method. This shows there is some variations occurs in the favourite mode of learning. Hence the null hypothesis states that “there is no significant difference between the favourite mode of learning among the students” is rejected

4.12 CONCLUSION

Data interpretation and analysis is an important aspect of working with data sets in any field or research and statistics. They both go hand in hand, as the process of data interpretation involves the analysis of data. Data interpretation is very important, as it helps to acquire useful information from a pool of irrelevant ones while making informed decisions. It is found useful for individuals, businesses, and researchers.

SUMMARY AND DISCUSSION

CHAPTER – 5

SUMMARY AND CONCLUSION

5.1 INTRODUCTION

This chapter brings out the findings of the study, implications of the study and also gives some suggestion for the future study. The purpose of the study is to find the effect of integrated multimedia in teaching science for high school students vs conventional method of teaching. The findings were based on the gender, mother's qualification, father's qualification, favorite mode of learning. The comparison between the conventional method of teaching and integrated multimedia teaching is also done to find is there any differences occurred between them. The concluding chapter provides a comprehensive summary of the entire research, presenting the findings, identifying areas for further exploration, offering recommendations, and discussing the implications of the study across various domains. The importance of this research in the current context is underscored by providing appropriate illustrations.

5.2 CONCLUSION BASED ON THE FINDINGS OF THE STUDY

The previous knowledge on the science concept “light” of the students were found by conducting a pre test with the help of the question paper which the investigator prepared. Then the lesson was taught by using both conventional method of teaching and integrated multimedia method of teaching. From the collected data analysis and interpretations were done. Their findings are listed below.

- Based on classification of gender the data suggests that there is no significant difference between the two groups in learning through integrated multimedia teaching.
- Based on the t - test it is evident that $t = 2.5791$ is statistically significant. Hence the null hypothesis states that “there is significant difference between the achievement level of students taught through conventional method of teaching and integrated multimedia method of teaching”
- The majority of the mothers completed their high school education, the values are not statistically significant. Hence the null hypothesis states that “there is no significant

influence of mother's education qualification on the academic achievement of the student taught through integrated multimedia”

- The majority of the fathers completed their high school education, the values are not statistically significant. Hence the null hypothesis states that “there is no significant influence of father's education qualification on the academic achievement of the student taught through integrated multimedia”
- From the percentage analysis there is a slight variation in the favourite mode of learning according to the learners. Hence the null hypothesis states that “there is significant difference between the mode of learning”

5.3 EDUCATIONAL IMPLICATION OF THE STUDY

Arrival of computers and internet in the field of education has changed the pattern and the procedure of the education. Growth and development of such things improves the quality of education. This will also help the students to learn effectively. Integrated multimedia method of teaching is like an ice breaker which will break the monotonous method of teaching and learning process.

- Integrated multimedia method of teaching helps to gain the attention of the students during the class hours.
- All kind of learners can get benefitted from the Integrated Multimedia method of teaching.
- Images, videos can help the visual learners to learn the concept effectively
- Audios, podcasts will improve the learning of auditory learners.
- Students were aware of the technology and were able to learn the new concepts towards technology.
- Teaching through the Integrated Multimedia method the teachers should aware of the technology. He / She should have an UpToDate knowledge in the field of education.
- Integrated Multimedia method of teaching has to be inculcated in the schools with modern technologies.
- The basic needs like computer, projector, white screen, speakers, internet connection has to be fitted inside the classroom.
- For advanced conditions the white board or white screen can be replaced with smartboards or interactive teaching boards

5.4 RECOMMENDATION OF THE STUDY

The current study is a primary step in comparing the conventional method of teaching and integrated multimedia method of teaching. In future, the variables can be changed according to the investigator for a wider study.

- The study can be done at primary level to integrate all the senses for the students and make them more active.
- This study can be utilized in future for the students with special needs.
- The study can be done at various locality like rural vs urban
- The study can carry out between the various types of schools like private school vs public school vs aided school

5.5 CONCLUSION

The concluding chapter provides a comprehensive summary of the entire research, presenting the findings, identifying areas for further exploration, offering recommendations and discussing the implications of the study across various domains. The present study concludes that the students were aware of integrated multimedia method of teaching and also feels active while learning towards this method of teaching. Implementing this method of teaching in schools will help the students to learn more effectively.

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APPENDICES

PERSONAL DETAILS OF THE STUDENT

1. NAME OF THE STUDENT :
2. ROLL NUMBER :
3. CLASS & SECTION :
4. GENDER :
5. NAME OF THE SCHOOL :
6. DATE OF BIRTH :
7. AGE :
8. LOCALITY :
9. MOTHER'S NAME :
10. EDUCATION QUALIFICATION :
11. OCCUPATION :
12. FATHER'S NAME :
13. EDUCATION QUALIFICATION :
14. OCCUPATION :
15. FAMILY INCOME :
16. MOST FAVORITE SUBJECT :
17. LEAST FAVORITE SUBJECT :
18. FAVORITE MODE OF LEARNING : conventional method / integrated multimedia

**AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR
WOMEN, COIMBATORE**

ACHIEVEMENT TEST

CLASS: VII

TOTAL MARKS: 25

I. CHOOSE THE CORRECT ANSWER

10 X 1 = 10 Marks

1. We can change the path of light
 - a. When it falls on a person
 - b. When it enters a dark room
 - c. When it falls on a polished or a shiny surface
 - d. When it falls on a pin hole camera
2. In a mirror, only the sides of an object changes but the image appears
 - a. Upside down
 - b. Tilted
 - c. 90° left
 - d. Erect
3. The word “AMBULANCE” is written in
 - a. Reverse order on an ambulance
 - b. The form of its mirror image on an ambulance van
 - c. Correct order on an ambulance
 - d. Random order on an ambulance
4. The other name of sunlight is
 - a. White light
 - b. Black light
 - c. Colour light
 - d. Prism light
5. Which of these is not a natural source of light?
 - a. Sun
 - b. Star
 - c. Candle
 - d. Fire

6. Identify the transparent object
 - a. Clear glass
 - b. Wood
 - c. Plastic paper
 - d. Bricks
7. Which of the following allows light to pass through it easily?
 - a. A metal plate
 - b. A glass tumbler
 - c. A book
 - d. A wooden block
8. Which of the following reflects light the most?
 - a. Mirror
 - b. Piece of paper
 - c. Cloth
 - d. Brick
9. In the morning, when the sun rises in the east, your shadow will be seen on the
 - a. East
 - b. North
 - c. West
 - d. South
10. We cannot see an object when
 - a. It reflects light
 - b. It casts a shadow
 - c. There is no light
 - d. It refracts

II. Fill in the blanks

10 X 1 = 10 Marks

11. _____ is a source that enables to see the things around us.
12. The sun and a light bulb are the example for _____ object.
13. We will be able to see through these materials very clearly, if the material is _____
14. Butter papers, a sheet of paper smeared with oil are example for _____ material

15. Materials that completely block light are called _____ materials
16. _____ is a process by which sound or light waves travel through a medium such as air or water.
17. Light travels in a _____ line
18. The sun is _____ source of light.
19. A shadow only shows the _____ of the object
20. When light rays are obstructed by _____ object that we get a shadow of the object.

III. Match the following

5 X 1 = 5 Marks

Column A		Column B	
21.	Luminous object	a	Clear glass
22.	Non- luminous object	b	Smoked glass
23.	Transparent material	c	Pencils
24.	Translucent material	d	Cement
25.	Opaque material	e	The sun

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FOR WOMEN, COIMBATORE**

ACHIEVEMENT TEST

CLASS: VII

TOTAL MARKS: 25

I. CHOOSE THE CORRECT ANSWER

10 X 1 = 10 Marks

1. Light travels only in a _____. It is because of this property that _____ are formed.
 - a. curved line, shadows
 - b. straight line, shadows
 - c. straight line, reflection
 - d. curved line and then straight line, shadows
2. Light that hits a mirror gets _____.
 - a. Transmitted
 - b. Reflected
 - c. Absorbed
 - d. Refracted
3. Which of these is not a natural source of light?
 - a. Sun
 - b. Star
 - c. Candle
 - d. fire
4. _____ surface reflects the light well.
 - a. Water
 - b. Compact disc
 - c. Mirror
 - d. Stone
5. Light is a form of _____.
 - a. Matter
 - b. Energy
 - c. Medium

- d. Particle
6. Identify the transparent object
- a. Clear glass
 - b. Wood
 - c. Plastic paper
 - d. Bricks
7. In the morning, when the sun rises in the east, your shadow will be seen on the
- a. East
 - b. North
 - c. West
 - d. South
8. Reflection occurs, when the light
- a. about to reach a surface
 - b. approaches a surface
 - c. passes through a surface
 - d. None of these
9. Which of the following is the best reflector?
- a. plastic plate
 - b. plane mirror
 - c. wall
 - d. paper
10. The image formed by a pinhole camera is inverted because,
- a. light travels in straight lines
 - b. light rays become laterally inverted as they pass through a pinhole camera
 - c. light rays pass through the pinhole
 - d. light rays get reflected

II. Fill in the blanks

10X1=10

Marks

11. A plane mirror produces a _____ image
12. The light ray gets _____ when it falls on any polisher surface
13. Materials that completely block light are called _____ materials

14. The sun is _____ source of light.
15. Sunlight is a blend of _____ colours
16. Light travels in a _____ line
17. A shadow only shows the _____ of the object
18. Butter papers, a sheet of paper smeared with oil are example for _____ material
19. The splitting of white light into seven colours is called _____
20. A _____ reflection helps us to see the objects.

III. True or false

5 x 1 = 5 Marks

21. The image of right hand in a plane mirror looks like a left hand _____
22. Rainbow is formed by dispersion of which light by water drops _____
23. The image formed by the plane mirror is laterally inverted, hence the image seen through the periscope is also laterally inverted _____
24. We see planets because they reflect light from the sun _____
25. The image formed in a pinhole camera is always the same size as the object _____

INSTITUTIONAL HUMAN ETHICS COMMITTEE



Avinashilingam

Institute for Home Science and Higher Education for Women
(Deemed to be university under Category 'A' by MHRD, Estd. u/s 3
of UGC Act 1956) Re-accredited with 'A⁺⁺', Grade by NAAC.
Recognised by UGC Under Section 12 B Coimbatore- 641043,
Tamil Nadu, India

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06.01.2023

To
Ms. B. Durgashree
Department of Education
Avinashilingam Institute for Home Science and
Higher Education for Women
Coimbatore- 641043

Dear Durgashree,

Ref: Your proposal No. IHEC/22-23/EDU-06 entitle "Effect of
Integrated Multimedia in Teaching Science for High School Students"
submitted for approval of IHEC 19.11.2022.

The Institutional Human ethics Committee of our
University hereby grants approval to your research proposal No.
IHEC/22-23/EDU-06 entitled "Effect of Integrated Multimedia in
Teaching Science for High School Students" submitted by you. The
Approval number for the same is AUW/IHEC/EDU-22-23/XMT-06.

We wish you all the best in your research endeavours.

Regards

Dr. A Thirumani Devi
Member Secretary

