Chapter-3

Literature Review-III: Psycholinguistic and Sociocultural Perspectives on Multimedia Learning

CHAPTER 3

LITERATURE REVIEW-III

PSYCHOLINGUISTIC AND SOCIOCULTURAL PERSPECTIVES ON MULTIMEDIA LEARNING

3.1 INTRODUCTION

Multimedia technology refers to the use of words and images to present materials (Mayer, 2001). In this situation, linguistic or verbal materials can be present before the audience in both printed as well as in the oral form. In multimedia, a picture can be called materials, for example, photos, maps, graphs, diagrams and it can be in the dynamic form such as animation and audio-visual. The multimedia technology can be used for acquiring or learning knowledge.

The main objective of this chapter is to focus on second language acquisition with the help of multimedia materials which use words, pictures and videos to provide meaningful "input" and strengthen meaningful communication, interaction, collaboration and also facilitate meaningful "output".

The researcher has reviewed different studies on second language acquisition and its relationship with multimedia materials and discussed a model of cognitive processing in second language acquisition which is centred on interactions model and the cognitive theory of multimedia learning (CTML). He has also tried to explain how the multimedia technology can be applied to help these processes and basic principles of multimedia learning (Plass & Jones, 2005).

3.2 UNDERSTANDING MULTIMEDIA LEARNING

Multimedia provides stimulating possibilities for fulfilling the requirements of 21st century students. Multimedia learning can be used for teaching content by application of multiple media which comprise visual and auditory information and learners can use this information to construct knowledge (SEG Research, 2008). As we are in the initial stage of discoveries in the area of neuroscience so far, we are more familiar with more about of how the brain processes information than earlier. However, to understand the way multimedia technology can support the learners to learn, it is important to understand the fundamental concept of how the brain processes information for knowledge construction (SEG Research, 2008)

3.3 ASSUMPTIONS OF THE COGNITIVE THEORY OF MULTIMEDIA LEARNING

The cognitive theory of multimedia learning is based on three basic assumptions (i) **Dual channels** (ii) **Limited Capacity** and (iii) **Active processing**.

i. **Dual channels**: According to Austin (2009) the dual channel processing assumption is based on the seminal work by Clark & Paivio (1991). Students have many channels in their mind for processing verbal and visual materials unconnectedly (Mayer & Mereno, 2003, Williams, 2014). Therefore, students choose pertinent words "… for processing in verbal working memory and relevant images for processing in visual working memory" (Rudolph, 2017)

ii. **Limited capacity**: It is found that all human beings have a limited amount of information (verbal and visual) which can be processed in each channel at a time. This limitation in processing information beyond the capacity of the brain can be because of cognitive overload (William, 2014; Rudolph, 2017; Munassar &Yahaya, 2010).

iii. **Active processing**: Leaners play a vital role in meaningful and deeper leaning because learners' cognitive processing selects, organizes, and integrates the information (verbal and visual) which is combined with previous knowledge (Mayer, 2008, Rudolph, 2017).

3.4 PROCESSING OF INFORMATION IN THE HUMAN MIND

Human beings process information in their mind through a multi-step process which involves the "perception, attention, selection, organization and integration of information." (Sweller, 2003, SEG, 2008)

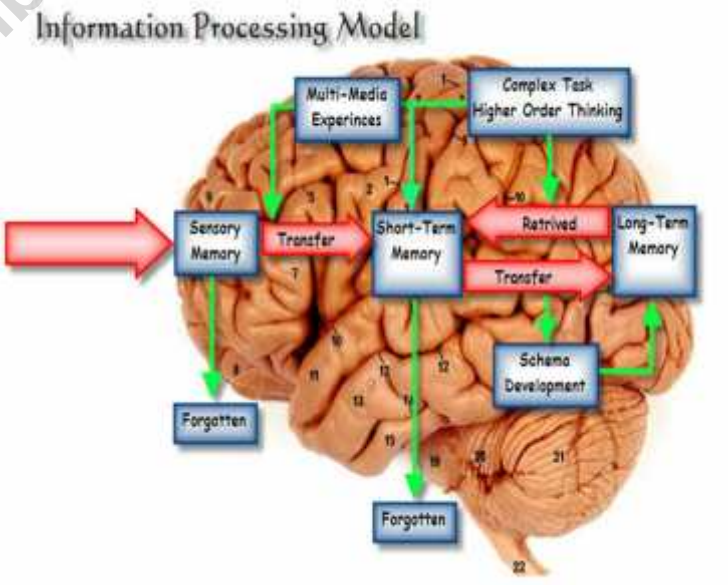

Figure 3.1: Information processing in human brain
https://www.google.images.in

The long-term memory is the centre of information processing. It stores information and gradually processes it into an accumulated form. The accumulation of information is organised into "chunks" of knowledge which are called schema. Schema permits the human mind to organise information in a meaningful way and support people to grab new knowledge in their mind (Chi, Glaser &Rees, 1982, SEG Research, 2008). In other words, long-term memory is that where information is stored and new information is put together. Before going into long-term memory, at first information is received and processed by working memory. The storing capacity of knowledge in working memory is very limited. It can only store a small amount of information which is later sent to long term memory. Miller stated that at a time one can only process about seven pieces of information and working memory can retain information for only 20 seconds (SEG Research, 2008 p. 1).

3.5 MULTIPLE INFORMATION PROCESSING CHANNELS

Many studies have been conducted on information processing channels and it is found that there are multiple channels in working memory. Baddeley (1992) suggested that there are two types of channels auditory and visual. The **auditory channels** manage to get information which is heard and **visual channel** processes that information which can be seen. It is also observed that texts have special kind of processing needs; the first word is captured through "visual channels" and transformed into sounds in the auditory channels (Mayer, 2005).

A study proposes that "visual channel handles less information than the auditory channel "....when information is presented using both visual and auditory channels, working memory can gain more information" (Miler, 2005). In addition application of "multiple channels" can develop the quantity of information that the brain can process (Sweller, 2005).

3.6 THE COGNITIVE THEORY OF MULTIMEDIA LEARNING

According to Mayer (2009), the theory of multimedia learning is based on the concept that learners try to develop meaningful relationships between words and pictures and they learn quite more in comparison to words or picture alone. The basic function of multimedia instruction is motivating students to develop a comprehensible mental representation of the materials which is presented before them. Moreover, students try

to develop understanding and make meaning from the presented multimedia materials as attentive and active participants, and finally create new understanding and knowledge (Rudolph, 2017; Sorden, 2012).

The use of cognitive theory of multimedia learning for second language acquisition is chiefly based on the dual coding theory.

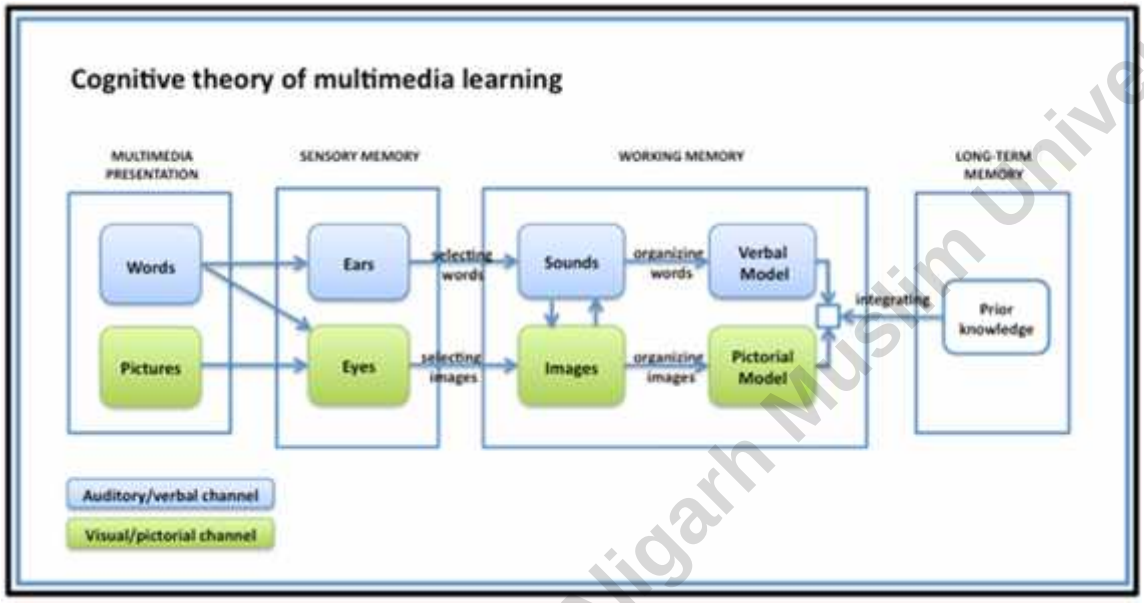

Figure 3.2: Mayer's cognitive theory of multimedia learning.
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It is understood that learners of the second language possess two different language systems (L1and L2) and a shared imagery system. It is recommended that interpretation or translation of linguistic items through immediate verbal and visual presentations may connect the two language systems and L1 can be an advantage for learning the L2 system (Paivio & Destrochers, 1980, Williams, 2014; Rudolph, 2017).

The cognitive theory of multimedia learning has been certainly a very influential theory for second language learning during the last few decades. It has been considered as a theoretical base by many studies (Jones &Plass, 2002; Al-Seghayer, 2001; Williams; 2014; Chun &payne, 2004). The cognitive theory of multimedia learning has three sub-steps (i) selection of appropriate verbal and visual data (word) from the multimedia input (ii) arranging the chosen words and images in the form of verbal and visual mental representation and (iii) integration of verbal and visual representation as well as prior knowledge with each other. Therefore, learning can

take place more effectively when the students are able to connect the verbal and visual mental representations together (Rudolph, 2017).

Several principles for better multimedia learning have been proposed on the basis of cognitive theory of second language learning. For example, presentation of related verbal and visual information at the same time (a principle which is used in the design of multimedia computer-assisted materials) and reducing cognitive load and respecting the individual differences of the learner (Mayer & Moreno,2003; Moreno,2004; Moreno & Duran, 2004; Williams 2014).

3.7 WHAT IS MEANINGFUL LEARNING?

According to Mayer and Moreno (2003), meaningful learning refers to comprehensive understanding of pedagogy and its teaching-learning materials. Students take part themselves in meaningful learning especially when they are capable of linking "information in the visual and verbal processing channels of working memory. In addition, when students are capable of capturing basic concepts and cognitively arrange the information and incorporate this information with previous knowledge (Mautone& Mayer, Templemant, 2012, Rudolph, 2017). Great challenges are faced by the teachers and materials designers regarding how to integrate new ideas and concepts which are interesting and involve students without any cognitive overload. Mayer and Mereno (2003) define cognitive overload as "when the learner's intended cognitive processing exceeds the learner's available cognitive capacity" (p.43). Mayer's information processing model has shown in the figure below.

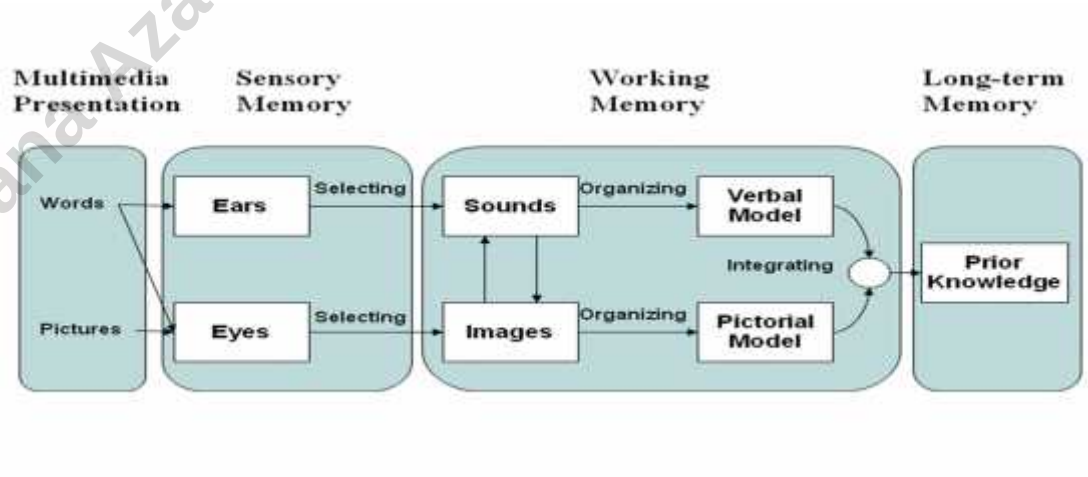

Figure: 3. 3 Information Processing Model based on Mayer 2005

Sorden, (2012) cited in Mayer, (2010) stated that effective and meaningful learning can only take place when the student is involved in the following five cognitive processes:

1. Selecting relevant words for processing in verbal working memory
2. Selecting relevant images for processing in visual working memory
3. Organizing selected words into a verbal model
4. Organizing selected images into a pictorial model
5. Integrating the verbal and pictorial representations with each other and with prior knowledge.

3.8 RELATIONSHIP BETWEEN BRAIN PROCESSING AND MULTIMEDIA

Society of Exploration Geophysicists (SEG) researchers have suggested that whatever, we know regarding the "information processing in the brain" is very much relevant to multimedia learning in the following way.

1. Effective multimedia takes into account that working memory has less capacity to process information.
2. A good multimedia presentation has the advantage of both auditory and visual channels in working memory to present content.
3. In a multimedia presentation, text only may be difficult to process. So, use of both visual and auditory channels is needed.

An effective multimedia presentation can identify that long-term memory organises information into significant "chunks" known as a schema. So delivery of information should be in such a way that use an organising pattern (schema) and help learners to arrange information and integrate it into the long-term memory (SEG research, 2008).

3.9 COGNITIVE LOAD THEORY

The cognitive load theory describes the way the mind can only process particular incoming sensory information into working memory (Rudolph, 2017; Sorden, 2005). In other words cognitive load theory function as a model for the instructional designer is based on the idea that how people acquire, process and retain new information (Seery, 2010). This theory is very significant for multimedia and instructional designer. Therefore instructional designer should adopt this theory while designing

instructional multimedia. Since students are capable of processing a limited amount of information at a time so, unnecessary information (content) should not presented to the leaner because it can distract the learners' attention. It is suggested by many researchers that understanding of cognitive load theory provide more effective learning and retention of information in the long-term memory that would be recalled when needed in the given situation. The theory identifies three types of cognitive load that are discussed below (Sweller, 2008; Ayres and Paas,2009; Seery, 2009;Rudolph, 2014).

i. **Intrinsic cognitive load**: The intrinsic cognitive load theory is associated with natural complexity of the content for learning. In another word, the intrinsic load is a significant cognitive load and there are two issues which influence the "intrinsic cognitive load": first, complexity of materials and second previous knowledge of students. Simply, the subject matter which is difficult for the beginner can be very easy for an advanced learner (Sweller, 1994;2010; Sweller& Chandler,1994; NSW, 2017). In addition, it also depends on the students' comprehension, understanding of the content materials and experience of the learner. It happens when the learner interact with the materials and previous experience of the learner (Sweller, 2008; Ayres and Paas,2009; Seery, 2009; Rudolph, 2014). Several studies have accepted that intrinsic cognitive load can be reduced through instructional strategies and multimedia technology.

ii. **Extraneous cognitive load**: Extraneous cognitive load is related to how the content of the subject should be taught to the learner. As Van Merrienboer and Sweller, described "Extraneous cognitive load … is a load that is not necessary for learning (i.e. schema construction and automation) and that can be altered by instructional interventions"(2005, p. 150). "Extraneous load depends on the quality or nature of the instructional materials. Poor materials or those that require a large amount of working memory to process will increase the load and leave little capacity for learning" (Seery, 2010). In other words, extraneous load is not good because theorist suggested that instructional design may be effective when it reduces the extraneous load to strengthen the capacity of working memory Sweller, 2008, NSW, 2017).

iii. **Germane cognitive load**: It refers to the learning load imposed on the working memory and assists in the transmission of information to the long term memory. The working memory processes and transmits information to the long-term memory through the schema construction system (Sweller, Van Marrieboer & Pass 1998, NWS, 2017).

Therefore it is considered as a good type of cognitive load. Many theorists have remarked that teaching materials may be effective when they reduce the extraneous load (which is not relevant for learning) and increase germane cognitive load that is positive for learning and it is helpful for the better leaning. According to Seery (2010) "Germane load is the mental effort required for learning. Because of the limited capacity of the working memory, germane load (the extent of learning) is dependent on the extent of the extraneous load, and also on the material and expertise of the learner – the intrinsic load. An expert on a topic is able to draw from prior knowledge and release working memory capacity for germane load processing".

However, learning a language is fundamentally different from learning any other subject matter, because, at the time of learning as a second language, the learner needs to handle both content as well as linguistic knowledge at the same time that can produce extra working memory load. Multimedia technology can decrease this type of working memory load and its effective use plays a vital role in learning and teaching the second language. Moreover, multimedia materials increase learning environment and reduce the cognitive load of the second language learner, and these leads effective learning.

3.10 A PARADIGM SHIFT IN SECOND LANGUAGE ACQUISITION THEORY

The main functions of language are to communicate ideas and information, manage social relationships and develop social discourse with others. Communication needs some essential competencies that comprise "input competencies" such as listening and reading and "output competencies" that is speaking and writing. Technology plays a vital role in integrating the competencies for communicating in the second or target language. It also supports the understanding of cultural and situational setting of communication. It may be helpful to see how different approaches to language learning deal with these different types of competencies (Kern &Warschauer, 2000, Plass & Jones, 2005).

The structural approach of language teaching was proposed in the beginning of 20th century which focused on the system of structures and considered language learning as repetition and habit formation. Such views followed from the influence of behavioural psychologists as John Watson and B.F Skinner. They categorically argued that language can only be developed through drills of language items and language pattern on the basis of linguistic categories and with a special focus on the grammatically correct responses to linguistic stimuli (Richards & Rodgers 2014,). In such kind of drills and practices sentence structure, grammar and vocabulary are imparted orally and in such competencies, social and cognitive process are not involved.

However, the supporters of the **cognitive approach** to language learning criticised the behaviourist idea in the late 1950s and the in beginning of 1960s. They focused on the significance of mental processes involved in learning a language. Noam Chomsky (1957) claimed that language development is facilitated by "innate cognitive structures rather than behavioural reinforcement." Therefore, English as a second language (ESL) teaching and learning process started to give emphasis on the promotion of learners' use of cognitive strategies to develop competence in the language. Which was based on understanding of students' cognitive processing of information (Chomsky, 1957; Chamot, 1995; Long, 1989; Postovsky, 1981, Plass& Jones, 2005) .

Therefore, the popularity of the cognitive approach to second language learning is increasing day by day and from the constructivist perspective in the language learning process learners are considered as active constructors of meaning. A paradigm shift has occurred in the model of transferring the correct grammatical rule and sentence structure from the language teacher to the student. Now, the acquisition of the second language is viewed as a personalized psycholinguistic process which is based on "comprehensible input" and allows the students to enhance their own competence in language, meanwhile developing their own grammar of the language (Caballe, Xhafa & Barolli 2010, Krashen 1982).

Moreover, the **socio-cognitive perspective emphasises** communication, collaboration and interaction among the students, it also gives a new definition to linguistic

competence by extending its emphasis from language competence to sociolinguistic and "communicative competence" (Tran, 2013, Atkinson, 2003 &Hymes, 1972).

In the **sociolinguistic approach**, the promotion of linguistic competence is noticed as surrounded in the specific sociocultural context which focuses on both students' development of cognitive structures as well as the social component of discourse and activity (Canale & Swain, 1980). In the present scenario, the second language is acquired through the natural practice of communication instead of the conscious process of learning which was the focus of the structural approach to language teaching and learning (Krashen, 1988).

3.11 INPUT-INTERACTION- OUTPUT MODEL (IIO MODEL)

Input-interaction-Output Model (IIO mode) was introduced by Gass in 1988, 1997 (in Block, 2003). The theory holds that language learning does not only require cognitive processes but the sociolinguistic and psycholinguistic processes inside the person's mind are also important. Moreover, environmental factors as well as socio-cultural factors can not be rejected, since all kinds of factors jointly influence the mind and are important to attain success in learning a language. Gass's (1998) IIO model is one of the language learning models. Gass in (Handayani, 2013) argued that Input-Interaction-Output model is the incorporation of particular ideas which influence the individuals in the second language learning process.

As Krashen has proposed notion of comprehensible input and filter hypothesis, similarly Gass proposed the idea of IIO model and incorporated interaction stage in her model. The language learning process in IIO model is probably the process which takes place in the individual's brain. In fact, the language learning process is not only learning cognitively but also requires proper environment to stimulate the brain itself with the help of social interactions. In addition, Gass describes IIO model in five major stages for example, "input, comprehended input, intake, integration, and output stages" (Handayani, 2013).

However, the present study will also review why multimedia technology can be a significant tool in English language learning and teaching in the process of second language acquisition by analysing basic concepts in Gass's Input-Interaction-Output (IIO) model: Apperception/Input, Comprehensible Input, Noticing, Intake, Integration and Output (Williams, 2014).

- **Simplified version of Gass's model of Input-Interaction-Output (IIO), applied to multimedia materials (1997)**

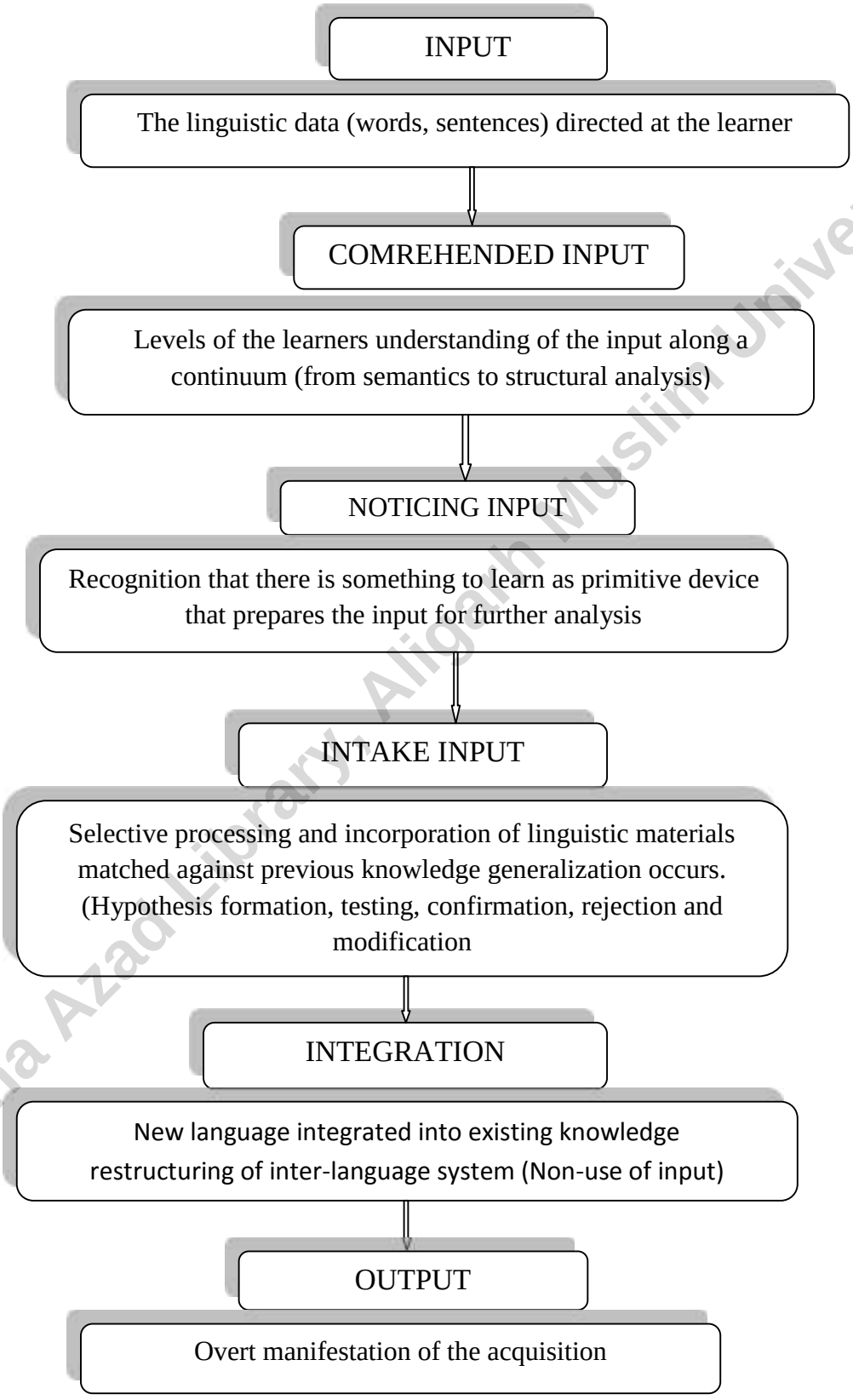

Figure.3.4: Gass's model of Input-Interaction-Output (1998)

Input denotes "… the process of receiving information either verbally or visually" (Plass& Jones 2005). Williams (2014) quoting Gass (1997) remarks that input is "the linguistic data such as word, sentence directed at the learner" (Berent, 2004). Second language learners will produce **Output** when they receive enough Input. Therefore, clear and concise input is the fundamental criteria of second language acquisition. This is the first stage of **IIO model** and at these juncture learners receives the incoming data. In other words, the input acts as a stimulus which students obtain while they hear and read. It is also called apperceived input (Handayani, 2013). **Apperception** "refers to the process of selecting words and pictures to support interaction and thus help comprehension of the material" (Plass& Jones, 2005). An effective input can be given to the students when the teacher work as a facilitator rather than just as a presenter and students actively take part in their language learning process (Hall &Hewings 2001).

Multimedia materials which are used as "Input" should be rich and effective; they should be selected because of their interest value among the students. Input materials should not be chosen on the basis of the type of vocabulary, grammatical structure and language they contain. Input materials should not be the beyond the capacity of learners. Finally, materials should be selected in such a way which provides contextual help to facilitate comprehension and learning. Cautiously chosen multimedia materials can fulfil all the above criteria and can be rich and significant resource materials for learning (Williams, 2014).

Plass& Jones, (200) remarked that "**Comprehensible input** is made more understandable for students through the use of interaction with the target language". Krashen, (1985) highlighted the significance of **comprehensible input** i.e, the language learning which students are capable to understand (from semantics to structure analysis). He opined that learners are learning at different stages and at every stage the input should be just a level above the learners' current inter-language (Ellis, 1994, Williams, 1994).

As teachers we know that lack of command over vocabulary can make an easy task very tough for learners. But multimedia technology makes meaning simpler, easier and clearer by illustrating relationship in such a way which is not possible with words alone. Moreover, in a heterogeneous classroom learners are different. Therefore,

similar input materials will not be comprehensible to the entire class in the same manner. Consequently, the language teacher should fulfil the diverse requirements of learners by providing various types of resources. For this reason also, multimedia technology is one of the best tools to satisfy the needs of a diverse group of students. It can be comprehensible for a variety of learners because MMM provides a rich learning context and its audio-visual features support the student's comprehension in such a way that other resources appear weak in comparison. Moreover, it is important to understand that after all leaner plays a vital role in determining the usefulness of input because only comprehensible input cannot benefit the learners. So, "input preference" is important among the learners, it allows learners to choose to pay attention or not to pay attention to given input. It is completely based on the needs and perceived value of input among the learners (Beebe, 1985, Williams, 2014). It should be kept in mind when the language teacher prepares lesson plan with the use of multimedia materials. The plan should be according to the requirements of the learner, interesting and enjoyable. Language teaching and learning with the integration of multimedia presentation can be attractive, interesting and motivating as long as it selected carefully and used properly.

The following stage is **Noticing "**The process of focussing attention on input" (Plass& Jones, 2005). Noticing input is considered as the recognition that there is something to learn, a preliminary device that prepares the input for further analysis. It is one of the significant stages of the language learning process. The conventional method of teaching English is to correct student's errors. But, current studies have found that language students are required to correct their mistakes or error by "noticing" themselves. Because, if the mistakes are corrected by the teacher, possibly students will commit mistakes again and they will hardly be ready for "Intake". The multimedia platform supports the students to notice their own mistakes and by replaying video clips taken while students performed their error-containing output (Gass, 1997; William, 2014).

Intake- It refers to selective processing and integration of linguistic materials matched against previous knowledge and leads to assimilation. In other words, students process "comprehended input" match it with previous knowledge and then **integrate** these either storing it for future reference or using it for instant production or make their own **Output** (Berent, 2004).

However, the **output** is an overt manifestation of the acquisition of language produced and "output" can serve as feedback to the intake component for hypothesis modification. Commonly, language student's requirement is to be pushed to produce output. Students must have a reason to produce "output" and they require a topic on which to produce "output" (William, 2014). Cautiously chosen multimedia technology can provide exciting and motivating topics and the instructor can "push" language learners to produce "output" by planning associated activities (Gass, 1997, William, 2014, Berent, 2004).

In short, Input-Interaction-Output (IIO) model describes how the second language acquisition takes place in the mind of individual learners. In reality, this process also shows how second language learners acquire language in five stages of IIO model. Gass IIO model has a greater range to accommodate different studies on second language learning. But she does not highlight regarding how social factors affects individuals in learning a second language (Handayani, 2013).

3.12 INTEGRATED MODEL OF (PLASS& JONES, 2005) SECOND LANGUAGE ACQUISITION WITH MULTIMEDIA MATERIALS

The researcher discusses here the key aspects of the **Integrated model** and has described the cognitive process which re involved and planning strategies for supporting these processes with the use of multimedia technology.

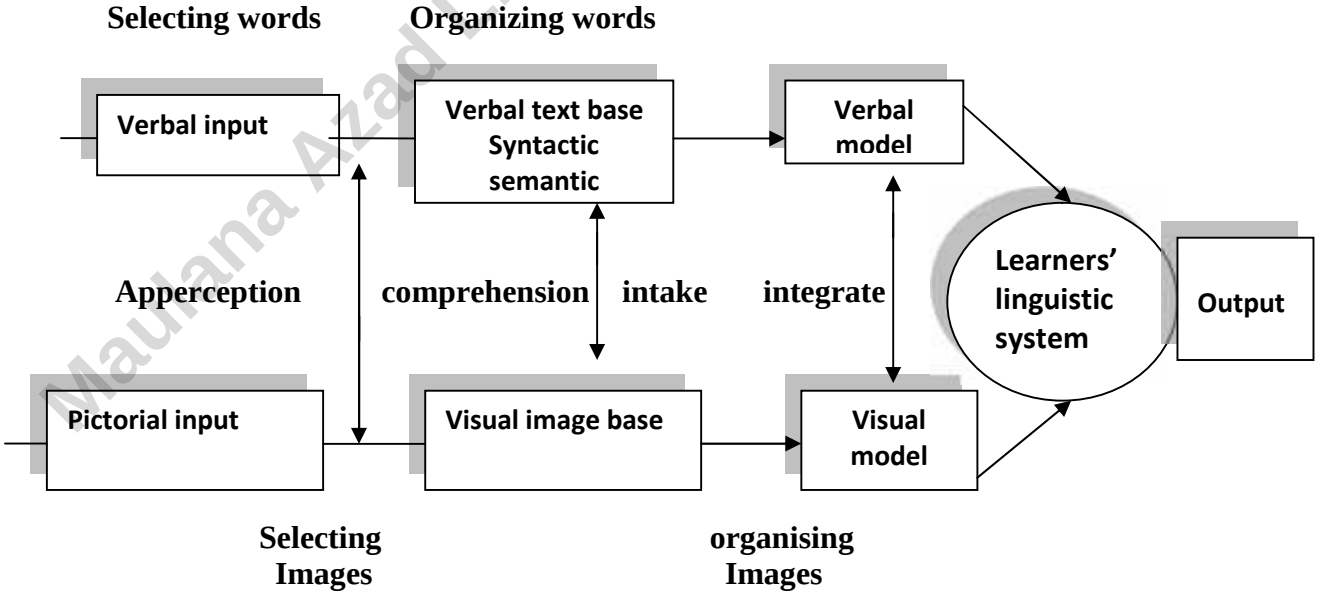

Figure 3.5: Integrated model of second-language acquisition with multimedia (Plass & Jones, 2005)

The integrated model of multimedia and second language acquisition (SLA) is presented in the figure (3.4) which was projected by Plass & Jones (2005). In the integrated model, Plass and Jones highlighted both multimodality and second language acquisition with the basic idea of apperception, comprehension, intake and integration. It is considered as the selection of input which students should choose from the beginning of processing and noticing, what is presented to them. Hence, if the content, idea, and information provided are verbal, the choice is cognitively signified in a text base. Similarly, when the content materials are in the form of picture in nature, the students' brain grabs it and places it in visual image base. Just after the completion of the selection process of materials, these are arranged into the visual representations as well as verbal mental representations. Plass and Jones's remark that interactive processing of comprehension of information and interaction with the use of the multimedia materials is become. Because learners can succeed in meaning construction only when meaningful interaction is possible. **Intake** refers to the input which can be positively understood and it can be integrated into the students' linguistic system. As shown in the figure (3.4). The final outcome of the entire process is "output" and the learners' creation of meanings by using their linguistic system (Frias, Obilinovi&Orrego, 2011).

Words and sentences are highlighted with the integration of multimedia materials, make learning of vocabulary easy and improve reading comprehension. Oral input can be improved in listening comprehension through active visual information. Several researchers have found that audio-visual media can facilitate the processing of linguistic knowledge and develop second language comprehension (Neuman&Koskinen, 1992; ScPainchaud, 1996, Plass& et al;).

In addition, interactive processing theory is a well-known theory that explains the process of organizing in the context two major skills of language that is listening and reading comprehension. This theory contains two significant strategies that are lower –level (bottom-up strategies which focus on the sounds, words and structures as well as higher- level (top-down) strategies which develop imagination and inferential strategies among the learner (Plass& Jones, 2005).

The use of multimedia materials helps in SLA by helping the learner in incorporating new knowledge into previous knowledge with an adaptation of advanced organising

skills. To give introductory materials prior the learning in this way triggers previous knowledge and such input facilitates comprehension in the reading and listening taks (Ausabel, 1998).

3.13 PRINCIPLES OF MULTIMEDIA LEARNING AND PEDAGOGICAL IMPLICATIONS

Multimedia technology is an emerging area of study. The present study is trying to identify the elements that make multimedia materials effective. The instructional multimedia designers need to use audio-visual media in such a way which effectively involve the students in the language learning process (Bull, 2013).Therefore, some key principles of multimedia learning proposed by different researchers have been discussed here. Learning that is presented by Society of Exploration Geophysicists (SEG researcher) in September 2008 as are following.

i. Words and pictures are better than words alone.

The basic principle regarding multimedia learning is explained in the finest way by Richard E. Mayer (2005). According to him "….people learns better from words and pictures than words alone". The Swellers' study (2005) revealed that the use of both words and pictures increases the information processing in the mind. He noted that narration and video are very effective in comparison to narration and text. Likewise, story and video are more effective than story and text. This is important to remember that learning happens when the information from the working memory is transferred easily to long-term memory. Therefore, multimedia materials support the activation of multiple channels of the learner's memory functions and information is successfully transferred from the working memory to long-term memory without any loss.

ii. Multimedia materials are more effective when learners' attention is focused, not split.

The use of multimedia materials can be very effective and meaningful when the students' attention is focused instead of split. Similarly instructional content can be more effective when the audio and video are presented simultaneously (Mayer, 2005). When audio and video teaching content are not presented simultaneously, students' attention becomes split and the mind has to make more effort in order to integrate the split sources of information. So it is clear the study by Mayer and Sims (1999) that

words and pictures delivered together are more effective than when presented sequentially (Mayer and Sims, 1994).

Multimedia learning materials which have both text and pictures and presented from a close distance are meaningful than those materials which use pictures and text presented from the very far on the screen. In addition "Integrated formats (e.g., presenting information on a single screen) are preferable to separate media (e.g., presenting information on the screen and on a separate sheet of paper)" (Mayer, 2005, Elliot, 2009; Chandler & Sweller, 1991).

iii. The presentation of content with multimedia should avoid extraneous and redundant information.

Many studies have recommended that multimedia learning is useful when it incorporates only that content which is relevant and associated with the teaching objective (Mayer, 2003). Some researchers point out that leaners learn more when "extraneous and redundant information" is not incorporated in the multimedia presentation. Moreover, the brain has limited processing ability that is why leaning is most effective when unrelated information is excluded from the presentation (Kalyuga, Chandler and Sweller, 1999; Elliot, 2009).

iv. Multimedia technology is more effective when it is interesting, interactive and easy to handle.

All students have their own unique quality. Some students are active and some are slow learners. All students do not learn at the same pace. It is proved by various studies that when the students are able to maintain the pace of the presentation then they learn more. "Researchers tell us that when the learners are able to control the pace of the presentation they learn more". Moreover, multimedia materials can be very effective for learning when students are able to interact with the presentation and operate easily and run it according to their own pace. Learners can achieve their pace according to the multimedia materials but they need to break the presentation into different small segments and select their own pace because longer segments offer less control on the learning materials (Mayer, 2005, Elliot, 2009 and SEG, 2008).

v. Multimedia learning materials are effective when students' knowledge structure is stimulated before interacting with the multimedia content.

With the application of multimedia technology, learning can be improved when the outline of given information is stimulating. And students' stimulation can be developed through previewing of content, presentation of materials, discussion, and recall and with written descriptions. Exercises like previewing, discussion, presentation and assessment, exercises, are helpful for the activation of previous knowledge of the learner (Elliot, 2009).

vi. Teaching with multimedia materials which consist animation can enhance learning.

A number of researchers have stated that learning can be improved with the application of computer-based animation in technological environments. Moreover, multimedia materials play a significant role especially through animation when the leaner faces difficulties in visualizing the process and dynamic phenomena which cannot be imagined easily (e.g glides of the tongue, electrical circuit and forces in physics). So, animation makes it easier for the student to visualize complex concepts and make sense of the information in such a way which requires little processing in the mind (Park, 1994, Elliot, 2009; Tversky, Bauer-Morrison and Betrancourt, 2002).

vii. **Multimedia materials are effective when the students are involved in the presentation.**

Multimedia materials are effective when content, as well as presentation, engage the students. Active participation of the learner creates knowledge and arranges information into meaningful schema (Mayer 2003). There are numerous ways to make presentation interesting and more engaging. Personalized multimedia materials involve more students in comparison to less personalized materials Mayer, 2005). The tone of presentation should be engaging and effective than the formal and traditional tone of the multimedia presentation (Mayer, 2005, Elliot, 2009; Chandler &Sweller, 1991; SEG, 2008. Engagement of the learners through presentation plays an important role in stimulating knowledge structures. And such presentation helps to grab new knowledge and assist in the transmission of knowledge from "working memory to long-term memory" (Mayer, 2005).

VIII. **Multimedia materials are effective when student can use their new knowledge as well as receive feedback.**

Multimedia materials are considered as an effective tool when the students get a chance to use their newly acquired knowledge. But they must be able to handle it. It reinforces and makes learning permanent. Actual learning takes place when the learners are given opportunities to incorporate whatever they are learning in their day to day life. Moreover, there are some other techniques which can support the learner to integrate whatever they have acquired associated with the "follow-up learning activities" such as classroom presentation, group discussion and collaborative work. In multimedia learning, instructional feedback is one of the important segments of the learning process. Therefore, it is important to give students clear feedback regarding their progress and status of learning. Feedback keeps the learners informed about their progress and this supports the learning process. Feedback is fruitful when it is given on a regular and immediate basis (Gee, 2005, Elliot, 2005, SEG, 2008, Perkins, 1992).

3.14 SCIO-CULTURAL PERSPECTIVES ON MULTIMEDIA LEARNING

In the area of second language acquisition, various researchers (Latolf, Donato, Thorne, Pavlenko, Lapkin, and Swain, 1989) propagated the socio-cultural theory for second language acquisition. They have tried to show that an understanding of SLA can be enriched with a socio-cultural perspective and how ESL students acquire target language when they meet, collaborate and interact with the target language speaker.

Vygotskian idea of socio-cultural theory (SCT) is a theory regarding the human cognitive and higher mental functions. This theory states that cognitive development and higher mental functions among human beings are increased through involvement in social activities and social interaction which need cognitive and communicative functions. The theory implies that students should be motivated to use these functions in such a way which nurtures and scaffolds them. In the socio-cultural perspective, children's language acquisition begins with the process of "meaning making" in a collaborative activity and interaction with other people of the given culture (Liwei, 2010; Aimin, 2013). Similarly, Lantolf, (2007) argued that the socio-cultural theory can be used for understanding second language acquisition (SLA) and opined that "learning is embedded within social events and occurs as an individual interacts with people, objects and events in the environment" (Cook, 2007).

In the context of second language acquisition (SLA), the idea of socio-cultural theory is very different from the learning theories of behaviourists and cognitivists. Since, the main concept of behaviourism is that language happens while learners give conditional responses to the stimulus and it considers language learning as habit formation. On the other hand the cognitivist believes in language learners' cognitive involvement in the language learning process when learners apply their minds in the learning processes. On the contrary, the socio-cultural theory offers a different idea of language learning which has two major components: cognitive and social (Aimin, 2013). As far as the socio-cultural theory is concerned, social interaction as well as cooperative learning is significant in making both cognitive and emotional pictures of reality. Learners' learning mutually depends on their cognitive effort, interaction, behavioural exercises and environmental phenomena. So, we can say that the socio-cultural theory gives a fresh perspective on the process of second language acquisition (SLA). It emphasises that language and thoughts are inter-connected with each other. The primary reason of such connection is socio-communicative activities (Ehrich, 2006; Lantolf, 2007, Aimin, 2013).

The fundamental concept of the socio-cultural theory is that language learning and cognitive development take place with social interaction. It states that "while neurobiology is a necessary condition for higher order thinking, the most important forms of human cognitive activity develop through interaction within the social and material environment" (Lantolf & Thorne, 2006, p.201). These types of cultural and linguistic setting can be created through the inclusion of society, family, peer groups, students and the teacher and organizing student-student interaction, sports, cultural programs and student centred language learning activities. Simply, the interaction of students and object in the environment is important for the cognitive as well as linguistics development (Gass &Selinker, 2008; Aimin, 2013).

3.15 THE ZONE OF PROXIMAL DEVELOPMENT

The idea of the zone of proximal development (ZPD) was proposed by Vygotsky (1896-1934). Vygotsky highlighted two different developmental levels (Chaiklin, 2003 cited in Aimin, 2013). "The first is the actual developmental level that is the level of skill reached by the child working independently. The second is the future development level that is the level of potential skill that the child is able to reach with

the assistance of a more capable instructor". He believed that learning always precedes development in the ZPD" (Aimin, 2013). Consequently, with the support of an advanced learner and materials, a student is capable of learning basic skills of language which is beyond the learners' real development. So, the Zone of proximal development favours the students' strength to learn the second language through collaboration with peers (Chaiklin, 2003, Aimin, 2013; Vygotsky, 1978; 1987).

3.16 PEDAGOGICAL IMPLICATIONS OF THE SOCIO-CULTURAL THEORY WITH MMM FOR SECOND LANGUAGE LEARNING

Socio-cultural theory lays stress on the understanding of some issues related to second language acquisition from the modern viewpoint which may differ from other theories of language acquisition. Moreover, the modern view gives various pedagogical implications for second language teaching and learning. One of the general consensuses regarding the framework of the socio-cultural theory is the idea that learning takes place when the learner interacts with other learners in the second language classroom. On the contrary, in conventional classroom teaching assessment, emphasis is given to the final product that how the learners have learned. On the other hand the dynamic assessment of classroom teaching and learning process tries to explore the process of learning as it takes place, while support is provided (Ehrich, 2006; Cook, 2007, Aimin, 2013; Vygotsky,1987) .

According to Hymes (1997), communicative competence denotes "the relationship and interaction between grammatical competence or knowledge of the rules of grammar and sociolinguistic competence or the knowledge of the rules of language use". Canale and Swain (1980) proposed three major elements of communicative competence which are grammatical, sociolinguistic and strategic competence in their theoretical framework of communicative approach to second language teaching and learning. This approach focuses on the significance of rules of language use rather than grammar for second language teaching and learning.

There are some rules of language in particular cultures which are considered as universal for all. Such are the rules of politeness which are given by Lackoff (1973). On the contrary these rules may not be same in other cultures. So, it is important to develop these in learners' consciousness of behavioural patterns in the target language culture and to promote their understanding towards socio-cultural practices while

learning the second language. To enhance learners' second language or target language, cultural understanding is very significant for the language learner. Here, multimedia technology plays a vital role in the learning of second language culture through audio-visual media even without knowledge of the high level of grammatical skill. Further, it can be used in such a way that can describe words easily and completely (Williams, 2014; Block, 2003).

The recent development of multimedia technology provides opportunities for a broader change, which involves collaboration with other learners with little constraints of time and place and integrated materials from personal experiences. Moreover, language learning can happen with the integration of multimedia materials through the sharing and discussion of teaching materials. Nowadays, students can go beyond the language classroom in groups and form multimedia user community with the help of new technological devices where they can share their unique ideas, information and contributions among their social networking groups. Through the interchange of messages, comments, and questions and through different media, such as audio, video and longer text they can learn a lot. In addition to multimedia materials connected to the internet, the system can be used as a tool to create online language learning communities (McCarty, Sato &Obari, 2017).

According to Rivers (1981) multimedia materials undoubtedly support learners in learning and understanding other languages and cultures by helping them to interact with the target language speakers through audio-visual media. Multimedia technology provides real life situations in the language classroom and teacher can show the learners their behaviours, culture and attitudes of the people whose language they are learning. They help to bring a wide range of communicative situations in the language classroom. Similarly, Williams (2014) has argued that effective multimedia materials are those materials which are "based upon a scientific description of the language to be learned carefully compared with a parallel description of the native language of the learner".

Therefore, while comparative linguistics was rejected as of inadequate use in second language learning, it has again proved its value as multimedia technology makes it clear that it provides effective opportunities for the second language learner to compare their language and culture with those of the target language speakers through

the use of audio-visual media. Such techniques are beneficial for both advanced language learners and beginners (Kern, 2006; William 2014; Yang & Chen, 2007).