CHAPTER II

LITERATURE REVIEW

Students these days literally grow up with technology. Technology is very much part of their lives, making them very much digitally wired. Prensky (2001) came up with a term that describes this group of people; they are the digital natives of today. Being digital natives, using technology is like second nature to them. Their lives are surrounded by many technological "tools and toys" like the television, computers, computer tablets like the Apple iPad and the Samsung Galaxy Tab, computer games and handheld games like Wii, Play Station and et cetera. Prensky (2001) declared that the average college graduate have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV).

Piroska Biro (2011) also presents the opinions of 618 students in connection with the new device. Based on their positive reaction the students appreciate the new equipment since it makes the lesson more interesting, more enjoyable, more fun and easier to understand the material. Also they are more motivated since they will search for information on the internet and internet helps them to enjoy the process of learning. Based on their negative reactions students complain about technical problems when the IWB is not working properly and they mentioned the inadequate skills of teachers to use the IWB as another problem related to the use of IWB technology.

Hence, it is no wonder that students these days find the chalk and talk method of teaching boring and unappealing. The methods used by teachers do not appeal to them and may not be relevant to them.

A. Process Theory of Writing

Several researchers (Adelman, 1997; Grabe, 2001; Santos, 1992; Silva &Leki, 2004;Woodall, 2002) stated that there is no one underlining theory for second language writing. The research studies carried out on the second language writing depend, to a high degree, on first language research studies (Devine et al., 1993; Pennington and So, 1993; Silva &Leki, 2004). These studies pointed out that second language learners have mostly the same cognitive processes in writing as learners who write in their first language. Therefore, theories of writing in the second language were based on theories of writing in the first language; a prominent theory is the process approach in writing as a pedagogical reaction to the product approach.

The product approach in writing underscored the accuracy of the final written product; teaching writing was restricted to teaching of grammatical, stylistic, and structural chunks which hindered the expressive flow of students‘ thoughts instead of boosting their communicative abilities. Giving priority to accuracy and correctness has turned the writing task into a monotonous practice rather than an interactive opportunity to receive feedback on content and to develop ideas in an organized manner.

The concept of writing as a cognitive process started with Emig (1971) who viewed writing as a recursive act. Afterwards, the process model of writing was developed by the two cognitive psychologists, Flower and Hayes (1981). This model was based on the cognitive theory of learning which maintains that writing does in fact happen in "steps," but these steps are not necessarily followed in the same order as in the stage model. Nor does each step lead directly to another in a sequential order. Instead, for the most part the writer moves fluidly back and forth between the processes that make up the act of writing. This cognitive perspective focused on the liaison between input and the mental construction device for second language acquisition.

Vollmer (2002) considered that the cognitive theory makes writing a cognitive activity that involves the learner in composing processes and strategies. In addition, Garner (1990) emphasized the integral role that the meta-cognitive theory plays in the process writing. This is because it demands from the learner to use three basic strategies while writing which are developing a plan of action, monitoring the plan, and revising the plan. The process approach allowed students to use writing as a heuristic to explore ideas about a topic through free-writing and brainstorming in the beginning of the writing process (Blanton, 1987; Spack, 1984; Zamel, 1980, 1982). The primary emphasis in the process approach is on the exploration of meaning and the development of ideas, whereas the teaching of grammar and form becomes subsidiary (Spack&Sadow, 1983; Zamel, 1976, 1985, 1987).

Unger and Fleischman (2004) explained process writing by saying, "This approach emerged from researchers‘ study of the steps that accomplished writers engage in as they write: planning and organizing ideas, translating ideas into text and reviewing and revising the result" (p. 90). Cushing Weigle (2002) pointed out that it is the individual that is the chief focus in the Hayes-Flower model, not the task and that the distinct parts of writing engage interactions among four components: working memory, motivation and affect, cognitive processes and long-term memory.

Later, the writing process includes the social context in addition to the cognitive process. The social constructivist theory highlighted the importance of negotiation and consensus in writing. Allan (2005) stated that according to the social constructivism theory, learners are viewed as interactive who learn beyond the context of pedagogical structuring into a process of social transformation‖. The focus in teaching writing has shifted from the final product to the different phases of writing through which the student writer communicates meaning and discovers ideas by interacting with others in a language context. Freedman et al. (1983) stated that conventional composition teaching focused on the message, the product, the written composition, analyzing style, organizational patterns, and rules of usage. The new rhetoric, in contrast, has consciously and deliberately shifted its focus to the encoder or writer, investigating especially the process of writing itself and the developing of writing abilities within that encoder. Accordingly, teachers orient their students to experience convenient and

correlated phases of the writing process: pre-writing, drafting, revising, editing and publishing.

During these phases of the writing process, students reflect on a given topic, exchange ideas with the class and then generate their own ideas. Prewriting is a significant phase. In prewriting, writers start to bring their ideas together. They explore a topic by drawing on their experiences to write about what they know and by interacting with others and sharing ideas with them to accumulate a certain input for writing. In agreement with this, Lee (2006) found out that there is a solid and steady relationship between topic-related background knowledge and the students‘ performance in writing; a variety of knowledge leads to better performance in different writing tasks. According to El-Mortaji (2001), prior knowledge plays a salient role in students‘ writing performance. Holliday (1996), in his turn, spotlighted the significance of giving students an opportunity to discuss or negotiate what they learn. Moreover, it is stated that familiar content and form facilitate the act of writing (Reid, 1993). Prewriting defines the topic, audience, focus, overall message, organization, and voice. To activate prior knowledge, the writer can make lists or organize ideas on a planner. It is worth noting that teachers de-emphasize language form and mechanics at the first phase of drafting to help students express their ideas fluently without obstructing their stream of thoughts. When revising their drafts, students focus on how to express their ideas more efficiently by taking advantage of their teacher‘s and peers‘ feedback.

According to Scordaras (2003), prior knowledge and writing experiences have a direct impact on students‘ revision processes. Later, students edit their writings for grammar and language mechanics to be ready for final publication. According to Hedge (2005), writing means the ability of students to produce whole pieces of communication, to link and develop information, ideas, or arguments for a particular reader or a group of readers rather than to construct accurate and complete sentences. Peregoy and Boyle (2001), in their turn, considered that cooperation and interaction among students together with the exchange of each other‘s opinions through oral discussion endorse language development and produce a sufficient comprehensive input about a writing topic.

B. The Interactive Whiteboard

A primary requirement in education in the 21st century is the integration of technology in the fabrication of teaching/learning process. With every new modus operandi, researchers and educationalists delve into its worthiness in the teaching profession, its suitability for specific population rather than another, its practicality and method of implementation upon usage, its validity and reliability in achieving intended outcomes, and its budget. The outcome of such investigation is a division in opinion between proponents and advocates of technology who commend the use of technology in education and opponents who prey on its pitfalls. The present section provides a definition of this new technology, the Interactive Whiteboard (IWB), surveys the opinion of both opponents and proponents, highlighting their arguments and the efficiency of IWB in the language classroom.

1. Definition and Functions

Interactive Whiteboard (IWB), as the name reveals, is a white electronic board, touch-sensitive, used as a presentation device and a casual board for writing or drawing. This white board is connected via USB port or wirelessly to a computer with appropriate software such as web browser or ActivInspire, and a projector; all of which are connected to electricity. Other tools can be connected to the board such as tablets. An IWB itself is a projection surface, not a monitor and can only display what a projector displays onto it (SMART Technologies, 2010). Through the digital projector, the computer screen is displayed on the whiteboard, which, consequently, becomes the screen and all applications on the computer can be controlled by touching the board by finger or with other accessories such as an electronic pen and making changes in real-time. Everything written or drawn on the board and all annotations or actions can be saved to and printed from the computer (Schmid, 2008).

The major brands of IWB are Promethean World and Smart Tech. Both companies provide these boards along with accessories, maintenance and training. According to the annual reports of these companies, the use of IWB is widely spreading. According to Smart Technologies (2010), 18 million students in more than 600,000 classrooms in more than 100 countries around the world are currently using an interactive whiteboard.

Harris (2005) lists three types of interactive whiteboards. These types reflect the stages that this new technology has passed through. The first type of IWB consists of an infrared/ultrasound kit that can be fixed to an existing

traditional whiteboard. This IWB does not have the same number of functions as an active whiteboard. A simple lacking feature is the inability to save any new notes to the lesson; once the kit is turned off, nothing is available except what is written on the board. The second type is a passive whiteboard that is sensitive to finger manipulations and has more functions than an infrared kit. The last one, which is the most recent, is the active whiteboard, which can be used with both a special pen and a human finger.

The pen or other object acts like a mouse on the screen, allowing the user to operate the computer from the board. This kind of interactive whiteboard has the most functions especially with the type of software used. In addition, a whiteboard can be portable or fixed. The majority of boards in classes are fixed. However, portable boards need to be set up again and calibrated each time when it is carried to another place. IWB also comes in different sizes, but the most common one is 190 centimeters in width. This standard size is the most preferable since it ensures clear visibility in majority of classes.

Interactive Whiteboards can be a portable one placed on a rolling stand and moved from room to room (See figure 1), or a fixed one always connected to a computer and a projector (See figure 2).

Figure 1. A mobile Interactive Whiteboard

Figure 2. A fixed Interactive Whiteboard

Several devices can be used to facilitate and enrich teaching and learning in an interactive classroom. An interactive pen is used by a teacher or a student to write on the board (See figure 3).

Figure 3. Interactive pens

The interactive feature of the board depends on its type and the material used in its manufacture. The first type of interactive whiteboard is made up of a solid impact-resistant material, which interacts only with pen (or stylus). The pen sends signals from the whiteboard to the computer. Limiting the input to the pen can be a disadvantage; in case of any malfunctioning of the pen, interaction with the whiteboard would be impossible. The second type of interactive whiteboards uses the infra-red scanners which detect all the movements across the board. A special electronic pen with encoded information is used. This pen allows the scanner to identify the position of the pen on the board and other types of input. This type of boards is the most practical and affordable since it permits to use the traditional whiteboard and not necessarily install a new one. This is why this type of boards is becoming more and more popular among schools. The third type of whiteboard is made up of a dual membrane and has a soft, flexible surface. It has two layers of resistive material which are touch-sensitive. Interaction takes place by touching the board via any pointing device like a pen or even a finger. This type of whiteboards simulates a natural tendency – using one‘s finger which is considered the most natural application of the interface. Besides, this type of boards can be used like traditional, ordinary whiteboards which teachers can write

on with a simple dry-erase marker. In this way, each teacher can choose to follow interactive or traditional lessons while fully using the interactive whiteboard (Stańczak, 2011).

Many researchers, like Walker, 2003; Miller & Glover, 2006; Smith et al., 2006 and many others, assert that IWB is a tool that supports both teaching and learning. IWB simulates the instruments that are used in traditional classroom teaching ability to write, draw, and erase. It also provides a variety of functions: highlighting texts, handwriting recognition, capturing and manipulating web content, shading, coloring, and animation where an object can move according to a pre-determined direction, dropping and dragging objects on the board in various directions, hiding and revealing objects on the board and placing them into layers, creating virtual versions of paper flipcharts, using virtual rulers, protractors, compasses and other tools, manipulating the size and direction of objects, and adding a response to objects when a certain command is fulfilled (Glover, Miller, Averis, & Door, 2007).IWB acts as a multi-modal portal, which enables teachers to include still, moving images and sound when presenting lessons (Somekh et al., 2007). With this variety of actions, many learning activities can be implemented: creating digital activities with instructional material such as images, recordings, videos and multimedia, manipulating text and images and saving these modifications, showcasing presentations, websites and other online activities like sending e-mails, getting students to solve exercises that require their interaction, and simulating scientific phenomena and processes. Depending on the software, it provides the option of connecting over the internet to a library of subject specific

flash content like a virtual calculator, interactive maps, virtual frog dissector and the like. Many of these libraries are available at the IWB manufacturer‘s website, so that content can be added on a regular basis, giving teachers more options. Other options of interaction are available depending on the accessories available. To illustrate, students equipped with tablets connected to the board can respond to instructions they receive. If a voting device (ActivExpression) is available, students can pass their opinions creating dynamic interaction with the entire class.

Marzano (2009) investigated the impact of the IWB through eighty five action research studies conducted by teachers in fifty schools across the USA. The control group comprised 1622 students taught in regular classrooms, while the experimental group included 1716 students taught in Promethean ActivClassrooms. The results yielded positive percentile gains in elementary, middle, and high schools, with a significant effect size for elementary and secondary schools without middle schools. Moreover, there were positive percentile gains in language arts, mathematics, science, and social studies, and a significant mean effect in language arts, mathematics, and science but not in social studies. Furthermore, Albaaly (2010) pointed out that meta-analytic findings suggested relatively large percentile gains in student achievement underfour conditions: (1) a teacher has 10 years or more of teaching experience; (2) a teacher has used the technology for two years or more; (3) a teacher uses the technology between 75 and 80 percent of the time in his or her classroom; (4) a teacher has high confidence in his or her ability to use the technology.

2. The Use of IWB in Language Classrooms

Since 1991 when Smart Tech Inc. manufactured the first interactive whiteboard, many empirical studies have been conducted at different milieus with different participants and for various purposes revealing mixed-outcomes as to the usefulness of IWB. Among the purposes of inventing, the IWB is in the field of pedagogy. An IWB can be employedas a tool to enhance teaching and as a tool to support learning‖ (Smith, Higgins, Wall, & Miller, 2005, p. 92).

Jennifer Lisi (2010) followed a quantitative and qualitative research on the efficiency of the IWB in teaching the French language. She surveyed attitudes and perceptions of teachers of FSL (French as a Second Language) towards the IWB. In her research analysis, she arrived at the conclusion that teachers appreciated IWB mode of enriching FSL instruction as well as learning. She also acknowledged the necessary training that teachers needed to undergo in an attempt to benefit from its optimal potential. On the other hand, teachers had mixed attitudes towards the push or technology use in the FSL classroom. IWB is used in the language classroom to enhance interactivity where interaction acts as a focal point in classroom, to influence students‘ motivation, attention, and engagement, and to attend to their multiple intelligences.

Albaaly (2010) investigated the impact of the IWB on the Egyptian medical school students‘ ESL essay writing and attitudes towards writing. The study comprised sixty students randomly selected and later divided into control and experimental groups. Results indicated that the IWB had no positive impact on the Egyptian students‘ attainment in ESL essay writing. However, the IWB had a

positive impact on students‘ attitudes towards both writing and towards the board itself. The findings regarding students‘ achievement in writing was contrasted to a study conducted by Martin (2007) in which the use of IWB led to improvement in whole class writing in Scotland.

Swan, Schenker, and Kratcoski (2008) explored if the use of IWBs in English language arts and/or mathematics lessons increased students‘ scores on state achievement tests. The study included students in the third through eighth grades in a small urban school district in northern Ohio. Findings indicated that the use of IWB significantly increased students‘ achievements in the fourth and fifth grades and slightly improved students‘ achievements in other grades.

Lopez (2010) compared the effect of the IWB on performance of students in English Language Learning (ELL) settings and those in traditional settings. She found positive contributions of the IWB on the performance of students in ELL settings.

3. The Use of IWB in Indonesia

Although the IWB has been used successfully in institutions of learning in many developed countries, the use is relatively new in most Asian countries like Indonesia. In Indonesia, a majority of international schools, if not all, have adopted the use of IWB as part of its teaching and learning endeavors. While there might be a few public schools that are chosen as pioneers to head pilot projects on the use of IWB, as a whole, public schools in Indonesia have not adopted this technologically supported teaching nation-wide. However, there has yet to be any

immediate plans to introduce the interactive whiteboard in the local public schools.

The use of interactive whiteboards is not something new this country. Since its introduction, it has gained popularity in Indonesia. The IWB has been used in different levels of educational institutions. From pre-school, primary, secondary school level to tertiary level, the penetration of IWB seems to be wide. Apart from the mainstream educational institutions, the IWB has also shown to be a great teaching tool for students with disabilities. It enhances interactive learning between children, regardless of the disabilities. Children with disabilities may have issues with using physical objects such as pencils and paper, but with the touch screen technology of the IWB, disabled children are able to enjoy using their fingers to write and draw on the interactive screen (Low, 2009).

IWBs have been used and researched extensively in the teaching and learning process in the fields of science, mathematics and languages, especially in developed countries as stated earlier. These research have reported a positive impact on the learning outcome in students. However, these research were done in the context of the respective countries overseas.

4. IWB and Interactivity

The idea of collaboration has been the highlight of many studies that investigated the interactive nature of IWB. The interactive use of IWB allows spontaneous and collaborative teaching and learning (Kennewell& Beauchamp, 2007). Thanks to the innovative activities it permits, students can learn together on the board or they can watch and interpret a simulation of a mechanism. To

illustrate, students can match words to their corresponding pictures while being coached by the teacher or in collaboration with their peers (Schmid, 2008; Kennewell, et al, 2007). As to interaction, it is relevant to the technical function of the board the production of sound when touching a picture, for example. Smith et al. (2005) credit the efficiency of technical interactivity of an IWB as the reason that teachers are able to speed up the pace of a lesson.

In fact, interaction can be examined on an individual level or collective level within the classroom system. Interactivity on the individual level has its roots in the way learners are ready to interact with the board, to the extent that learners interact with content and engage in their personal learning. It involves many skills that learners use like activating background knowledge, critically thinking, interpreting, analyzing, reasoning and making sense of information and drawing on new strategies for accessing and constructing knowledge following their own pace. On a collective level, interactivity refers to the exchange of knowledge within a group between peers. That is, learners will interact with their peers, in small or large group to work on activities or tasks. In such an interactive atmosphere, students will appreciate the value of discourse and collaboration through shared construction and exchange of information. The role of the teacher would be managing the learning environment and students would be immersed in their learning, inquiring, exploring, and constructing knowledge under the guidance of their teacher (Lim-Fong, 2010). This corroborates with the implications of the social constructivist theory.

Smith, Higgins, Wall and Miller (2005) state that the uniqueness and the boon of the technology lies in the possibility for an intersection between technical and pedagogic interactivity (p.99). In other words interactivity with the board, whether individual or collective, does not foster classroom interaction. Here comes the teacher‘s role in organizing and preparingthe content to achieve the intended results where IWB‘s use is purposeful.

According to Glover and Miller (2007), upon using IWB, teachers progress through three stages of interactivity: supported didactic, interactive stage, enhanced interactivity. At the supported didactic stage, IWB is used as visual support and is not yet used pedagogically. At this stage, most of students‘ attraction is the result of the novelty factor. The second stage, the interactive stage, is a transitional or can even be called an experimental stage. The teacher uses a variety of stimuli to illustrate, develop, and test discrete concepts. IWB becomes the focal point of the lesson and teachers still show an occasional lack of confidence as they still search for new approaches to pedagogy. At this stage, teachers are more excited and share their experiences with other teachers. The third stage, enhanced interactivity stage, is when the teacher exploits the interactive capacity of the IWB seeking to integrate concepts and cognitive development. IWB is then used to explain processes, prompt discussions, develop hypotheses and the like by varied application. This stage requires advanced skills on the behalf of the teacher like careful lesson preparation including verbal, visual, and kinesthetic activities, the ability to store and edit lessons, and the willingness for pedagogic change. This last stage is the culmination point of using

IWB to achieve the greatest impact on the teaching/learning process. Indeed, as Higgins et al. (2007) concludes: teachers are the critical agents in mediating the IWB software and the IWB hardware to promote interactions and interactivity.

Another type of interaction that takes place in the presence of IWB is socio-cognitive interactivity. This type of interaction results from brainstorming of ideas between teacher and students and/or between students and students to co-construct knowledge. Levy (2002) found that when students use IWB to present their own work, it becomes a point of focus for teacher-student and student-student discussion and feedback‖ and leaves more time for interaction between the students and teacher and for task-related activity. A study by BECTA (2007) concluded that with IWB, students can direct their attention and supports participation in whole-class teaching.

Some researchers claim that teachers need to use appropriate software that enhances student interaction (Armstrong, Barnes, Sutherland, Curran, Mills, & Thompson, 2005). Good quality IWB software could be a good option for teachers to incorporate interaction into pedagogy. One example is discussed by Thompson &Flecknoe (2003) where a software product called EasyteachMaths was used. This software was designed to bring students to the IWB, more directly involving them in the lesson.

5. IWB And Vocabulary Acquisition

Many researches have studied the impact of IWB on the acquisition of various language skills and sub-skills in EFL classrooms. Their arguments revolve around the potential waste of resources if new technological tools are not

incorporated in teaching practices (Dunkel, 1987). At this stage, it is vital to review the literature of using the new technology, IWB, and its impact on various skills.

Language teachers can benefit from the direct access to dictionaries and encyclopedias provided by either websites or software programs. When encountering a problem with a new word, the teacher can immediately display that word with all the forms and sample sentences. Thanks to the audio and visual materials associated with IWB, students can easily understand even abstract concepts. A teacher can display a photo or picture expressing the word. In this case, students get a full picture of the meaning of that word, its use, its related structures and even its etymology. According to a study done by Martin (2007), the majority of students reported that the pictures and the sound help them to understand better.

Chen (2009) investigated vocabulary acquisition in Grade Four elementary class in Taiwan through an experimental research. The vocabulary retention method was based on the comparison between semantic clusters and thematic clusters through explicit instructions via Interactive Whiteboard as a pioneering method since it was the first time IWB was used in such manner, according to Chen. He credited IWB not only for saving time and money in making instructional material, but also for its interactive nature especially in the acquisition of words.

However, when he arrived at the analysis of results, he concluded that IWB‘s effectiveness in English teaching cannot be taken for granted and needs

more investigation‖ (p. 63). He explained thatwith the IWB, not only the teacher but also the learners seemed to have stuck to the board due to the physical nature of it‖. Chen seemed to be surprised by this outcome because he did not expect such a result.

6. IWB, Classroom Management and Students' Engagement

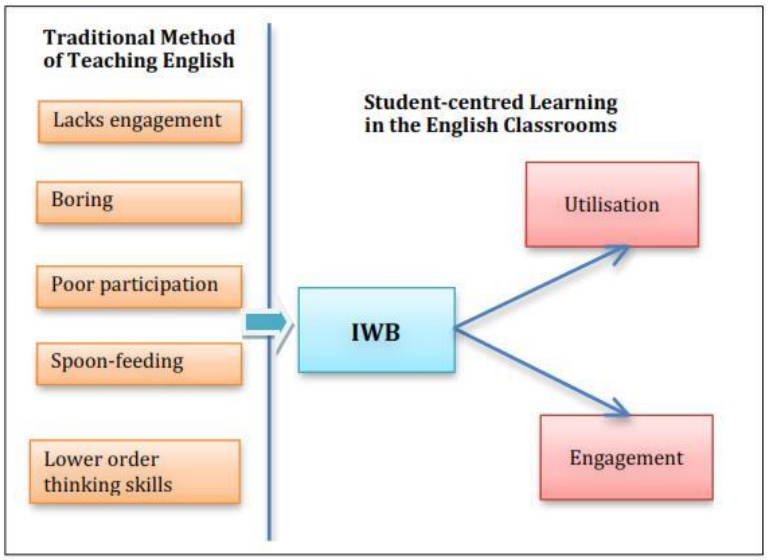

Figure 1.2 Traditional method of teaching English

Figure 1.2 above is the conceptual framework of this study. Under the traditional method of teaching English, the classroom environment is one that lacks student engagement. Teachers teach via the spoon-feeding method, which is a top-down transmission of knowledge from teachers to students. Students become passive recipients of knowledge. Students may find it a challenge to concentrate or stay focused during English lessons, as it does not engage students with active participation or interactivity. This breeds boredom and lack of interest in learning English, resulting in a lack of participation in learners' learning process. Due to the nature of this teaching method, thinking skills in students are

rarely cultivated and activated, resulting only in lower order thinking skills being honed. However, with the IWB, literature has shown that there could a shift from teacher-centered learning to student-centered learning. This digital tool acts as a medium of facilitation to students' participation in their learning process.

IWB plays a significant role in class management and motivation especially when it is used effectively. The higher the level of engagement is, the better the atmosphere for learning is. Various studies have shown that students who learned with the IWB were more attentive and engaged in learning, participated more actively in the classroom, and interacted much more with their teachers, their peers, and even with the IWB (Smith et al., 2005). Additional studies provided evidence that the IWBs serve as significant motivational tools for students, and facilitate students‘ desire to remain on-task (Levy, 2002).

As mentioned in the earlier section, the dominant merit of IWB is maintaining dynamic interaction with the entire class without isolating students by encouraging a higher level of student interaction in both teacher-directed and group-based exchanges. This type of student participation leads to an increased state of engagement as well as enhances the students‘ learning environment (Bryant &Hunton, 2000). Additional studies found that teachers skilled in the use of IWB create knowledge together with students in a dynamic process during the lesson. This dynamic strategy results in developing students‘ ideas and speculations and engaging them in critical thinking and joint ownership of the knowledge.

Julie Langan-Perez (2013) used the expression focal point when describing how IWB fulfills engagement considering that it provided ―visual reinforcement to complement instruction‖ and encouraged students to remain focused and engaged on the task at hand (SMART Technologies, 2010).

In his study, Levy (2002) supported that the quality of students‘ attention in many IWB based lessons is generally high (p. 10). He further explained that student engagement and interest is mainly due to the larger pool of available resources and means to provide enhanced explanation allowing students to have an easier time in comprehending ideas and concepts. He revealed that some teachers expressed that increased attention levels may be credited to novelty value. On the other hand, Beeland (2002) credited the visual aspects‖ of IWB as the main reason for increased student engagement‖ (p. 7).

7. IWB, Student-Centered Class and Learning Styles

If technology is to become a transformative device to enhance learning‖, then a pedagogical change must occur (Jones, 2011p. 258). In an effort to promote the use of IWBs, Jones et al. proposed alternatives to teacher-centered styles of delivery and expand the opportunities for classroom discourse beyond teacher presentation of facts‖ (p. 39). IWB offers the opportunity to better match learning to different student learning styles (Glover et al., 2007; Slay, et al, 2008). These learning styles include the kinesthetic, visual, audio, active, and verbal-social. In the same direction, Bell (2002) pointed out that IWB can provide materials for different learning styles such as tactile, audio, and visual. With the help of the

variety of the materials, different types of learners in a classroom can benefit from this technology.

Beeland (2002) praised IWB for its potentiality not only in meeting the needs of students with diverse learning styles but also in engaging students in learning. Some students may find a singular mode of communication difficult; therefore, including a variety of multimedia approaches in a lesson can attend to the needs of diverse learners (Somekh et al., 2007). To illustrate, a visual and/or a graphic learner can find IWB as highly captivating due to the easy inclusion of graphs, photos, and any other visual material; an auditory learner may benefit from the inclusion of sound in a lesson; and a kinesthetic learner is able to reinforce learning through exercises involving touch, movement and space‖ (SMART Technologies, 2006)

8. IWB and Instruction

Numerous studies have shown that the use of IWB improves learning processes specifically that it enables meaningful instruction upon the integration between the teacher‘s instruction style and the IWBs‘ potential (Betcher& Lee, 2009). It supports the effective integration of differentiated instruction to attend to students various learning styles and needs.

Levy (2002) revealed that using IWB for instruction may ―improve learning outcomes and increase learners‘ motivation. He indicated that it enables teachers to provide more vivid illustrations and better explanations‖ (p. 10). Moreover, Glover and Miller (2001) commended the use of IWB for instructions. They reported that using IWB in providing instructions aided teachers in

presenting lessons more efficiently in comparison to presenting lessons without an IWB (p. 262). Glover and Miller (2001) also reported the opinion of the teachers who considered that IWB allowed them for a more clearly defined structure and planned progression‖ of lessons (p. 262). In addition, most teachers, in a study conducted by Türel and Johnson (2012), reported that instructional use of IWB aided them with saving time. They concluded that IWB instructional use supported classroom management, pace and variety. Based on the evidence provided by these studies, it appears that there is a positive relationship between teachers‘ instructional use of IWBs and the effects on teaching.

9. IWB and Time Management

Technically speaking, IWB presents the feature of timing any activity according to the convenience of the teacher and the nature of the activity. IWB acts as an alarm. In addition, Chapelle (2001) states that if computers are used for language testing, teachers can save more time because computers do all the evaluation and calculation. Although the teacher might spend more time for the preparation of materials before the lessons, time spent during the lesson is usedmore efficiently by allowing students to ask more questions or practice the language since the materials are ready.

Levy (2002) stated that when the teachers use materials prepared before class, they save time for other teaching activities. With IWBs, teachers can allocate more time for students, focusing on individual problems, extra challenging tasks, and communicative activities because they do not spend a lot of time writing on the board. Normally, when the teacher is writing on the board,

he/she is facing the board not the class, so the teacher might not keep control over the class. Using IWB based resources may reduce time spent in writing and leave more time for teaching (Levy, 2002), and materials generated in the classroom can be saved, printed, and reused later (Levy, 2002; Walker, 2002).

In addition, Moss, Jewitt, Levaaic, Armstrong, Cardini, & Castle (2007) point out that the pace of teaching can be increased by bringing in and moving between the texts or materials quickly. When learner characteristics are taken into consideration, it was shown that the pace ofthe lesson can be increased and the lesson can be made more challenging with extra materials for students who are quick and good at learning new items.

10. Advantages of Using the IWB

While evaluating the benefits of technology in education, many criteria are considered and various perspectives and opinions are consulted especially of those who are directly affected by this new technology: teachers and students. Teachers try to find to what extent this new technology will facilitate the process of teaching, help in providing instructional material and decrease the load work. As to students who are too much indulged in technology, they try to relate their academic performance to such a novelty.

11. Advantages of IWB to Students

In the literature on the efficiency and validity of IWB, the majority of the reviewed scholarly studies reveal positive attitudes. Several researches have investigated the impact of IWB on students‘ perception and test scores. These studies have examined aspects such as the technological features of IWB

simulating phenomenon and explaining difficult concepts through interactive and sequential strategies and how IWB motivates and engages students (Kennewell, et al, 2007; Smith et. al., 2005). According to Warwick et al, 2010), IWB creates an environment that encourages dialogue and knowledge building among students. The use of interactive whiteboards creates a learning environ where students analyze, solve problems, share ideas, and work collaboratively (Brabec, et al, 2004). Magana and Frenkel (2004) considered the IWB as a prominent seedbed for upgrade student achievement. According to them, the primary target of designing the Promethean ActivClassroom was to ensure paramount practices of curriculum and instruction so that educators can transform classrooms meritoriously.

Smith et al. (2005) conveyed students‘ voice regarding lessons which are explained via IWB. They reported that students found lessons with IWB as overall more enjoyable and interesting (p. 96). Schuck and Kearney (2007) stated that students perceived lessons using IWB as ―better than‖ other class work. They related this to the fact that IWB can be perceived as easy to use, visual, interactive, immediate, and matching the students‘ digital culture.

In Wall et al. (2005) study, which was conducted with 80 students at 12 English primary schools, students commented that they felt their teacher was more inventive and active with IWB. The students were highly engaged because the teachers seemed better able to find original ideas or interesting ways to teach the subjects.

Akbaş and Pektas (2011) investigated the effect of IWB on the achievements of university students pertaining to the topic of electricity in a science and technology laboratory class. Findings indicated that students felt more engaged, excited, and enthusiastic during IWB lessons although no significant increase in students‘ academic achievement was recorded.

In Levy‘s (2002) study, students maintained that an IWB can make learning more enjoyable and interesting‖ and that they enjoy IW-based lessons more than other lessons and that students appeared to have higher interest and were more engaged in IWB lessons. Levy affirmed that when an IWB is used for instruction, it encourages students to pay more attention. Students reported that they were more able to focus their attention on IWB-based presentations and explanations. Learning is viewed more favorably by some students with an IWB because they are more interested, and because teachers‘ explanations, multimedia resources and the large screen make subjects easier to understand. IWB also allows students to share their own work with their classmates, which Levy (2002) concluded to be enjoyable for the students, especially that it is an effective means of presenting and discussing personal work. Students also recognized that IWB alleviated the time teachers and students normally would devote to writing during a lesson. They showed their appreciation to the fact that IWB manages time more efficiently. It allowed teachers to use time in the classroom more efficiently in terms of the ease and speed with which pre-prepared materials can be accessed and presented.

Wallace (2007) described how IWB and its software created a more captivating learning environment for students, who seemed to be attracted to this new technology. The interactive software supported teachers in displaying abstract ideas and concepts in a new-fangled ways which would enhance their understanding (Richardson, 2002; Miller, 2003).

Other studies have investigated the impact of IWB on different learning styles including students with special needs (Zirkle, 2003). Kaya, Akçakın, and Bulut (2013) examined the impact of the IWB on students‘ achievement in transformational geometry. Findings showed that interactive whiteboards led to gains in student academic achievement during the learning process. The interactive features of the IWB stimulate one or more of the senses, the thing which helps students retain learning longer. Kaya et al.‘s study, students were able to understand transformational geometry better due to the visual and distinctive features of IWB.

Other researches include findings that suggest positive impact on student sense of positive identity (Walker, 2003). Upon using IWB, the participants‘ attitudes towards language learning increased significantly. The researcher revealed that there was a link between students‘ attitudes towards IWB, its relevance to their course of study and their level of computer literacy, language level and age.

Amolo and Dees (2007) conducted a study on the contributions of the IWB to students‘ performance in Social Studies and found out that students showed an increase in interacting with content via IWB. The findings of many researchers

revealed that the use of IWB enhances motivation in students to learn, raises their level of concentration, and improves behavior because it is fun and innovative (Levy, 2002). Motivation, attention, and behavior represent an overall student attitude in the classroom. However, Slay et al. (2008) cautioned that pedagogic value is of significant importance in maintaining motivational effects. The use of IWB should be purposeful, in subject-specific ways, and should be embedded into teaching and learning.

Students‘ interaction with IWB influences the effects of the IWB on motivation, attention, and behavior. If students interact with the board themselves, motivation and attention can also be increased. Glover et al. (2007) reported that IWB use in the K-12 sector promoted student interest and higher levels of sustained concentration due to the multimedia aspects of the IWB.

Learning via IWB helps develop autonomous learning by means of developing a sense of self competence (Walker, 2003). In this manner, IWB may serve as a type of alternative to the teacher and as a center of attention contributing to the development of autonomous learning and higher order thinking skills. IWB seems to have positively influenced students‘ ability to understand complex concepts, for example, in math and science The multi-faceted technological presentation (that relates to a number of senses – sight, hearing, and sometimes even touch, when the student nears the board) aids students who have difficulty developing mental images of complicated concepts (Kennewell, 2006).

Zittle (2004), in a study in the United States, revealed the positive effect of using IWB on students‘ achievement. He examined the influence of lessons with

the IWB on elementary school students‘ achievements in geometry. In his quantitative experimental study, significant statistical differences were reported between the groups‘ achievements; the group that learned withthe IWB achieved higher scores than the group who did not learn with it.

Similarly, Dhindsa and Emran (2006) ran an experimental study on college students in chemistry. In this study as well, the group who were taught via IWB performed significantly better.

Lewin et al. (2008) reported that IWB became a mediator of interactions among students themselves, between students and the IWB and the teacher and students. The researchers concluded that students felt greater motivation to demonstrate their knowledge in the operation of the various functions of the board. They noted that positive gains were realized in literacy, mathematics, and science for children aged 7-11.

Thompson & Flecknoe (2003) noted significant improvement in academic attainment in math. They reported a 14.1% improvement in attainment in the first term, a 22.1% improvement in the second term, and a 39.4% improvement overall. Higgins et al (2005) tested the effect of IWB on the achievement of students in 5th and 6th grades in various areas of Australia. The data analysis showed that the use of the IWB contributed primarily to the achievement of students who were weak in the area of language, particularly in the area of writing. However, the researchers found no significant differences in test scores between schools using IWB and schools not using IWB. Other similar findings by Schuck and Kearney (2007) also reported that little or no difference was found on

national test scores in mathematics and science in UK primary schools when comparing IWB and non-IWB classrooms. It seems there are some contradictory findings as to the effect of IWB on achievement.

Regarding the issue of the suitability of IWB to different populations of students, teachers, in the study conducted by Bell (2002), posit that there is an advantage to the use of IWB‘s in elementary schools, and particularly with students with a learning disability.

Glover el al (2007) summarized the findings of various researches and studies and created a list of the five central skills that students need to be equipped with: (1) information or literacy skills that relate to the ability to gather, edit, analyze, process, and connect information, (2) higher order thinking skills in particular, problem solving, critical thinking, and creative and entrepreneurial thinking, (3) communication, collaboration and cooperation skills, (4) technological skills, and (5) autonomous learning skills.

Some research suggests that the real impact of IWB may lie in the affective domain that focuses on the learners‘ motivation, attention, emotions, self-concept, self-esteem, and social interaction in the learning environment. This type of learning is important to learning and achievement as it adds a social dimension to learning where students can share knowledge publicly and can learn by making mistakes together (Smith et al., 2006).

BECTA (2007) concluded that students‘ achievement was directly proportional to the time they are exposed to IWB. The longer the exposure is, the better the achievement (p.3).

12. Advantages of IWB to Teachers

In addition to the numerous benefits that students have reported, IWB renders specific benefits for teachers. First of all, IWB use in the classroom facilitates the ease of integration of ICT in classroom teaching. It also ensures flexibility as to the use of a wide range of virtual material and web-based resources that can save time. Such content can be applied easily by the teacher and can be further developed and customized to fit the teacher‘s purpose and lesson objectives. IWB allows teachers to organize and manage information and lesson content more effectively and efficiently. It also has the features of saving and storing the material after any modification for multiple reuses, which can be shared with others as well. With such features, teachers reduce the load of preparation they have (Kennewell, et al, 2008).

In their study, Türel and Johnson (2012) reported that nearly half of the teachers they surveyed and agreed that delivery of instruction had been altered due to IWB use. They concluded that some level of pedagogical change may have occurred due to IWB technologies (p. 390). In his article, Higgins (2010) conveyed the perception of teachers towards IWB. The teachers interviewed showed increased positivity towards the impact of interactive whiteboards on their teaching. They were also positive about the training and support that they had received as part of the pilot project. The majority of teachers reported that using the interactive whiteboard had improved their confidence. All of them felt that the interactive whiteboard helped them achieve their teaching aims and cited a

number of factors such as the wealth of resources available, the stimulating nature of the presentation and the flexibility that the technology offers (p. 90).

In the same direction, coping with and learning about IWB is an asset to teachers. Nowadays, it is an integral part of their professional development especially in this technological era. Armstrong et al. (2005) supported the idea that without professional development in this area, teachers may not know how to or have the skills necessary to use IWBs to their fullest potential (p. 465). Levy (2002) emphasized the relevance of professional development activities which are more in-depth than basic technical training (p. 19) on using IWB. That is, teachers receive training that targets pedagogical areas and enhances efficient and effective learning.

Levy (2002) continues that teachers need opportunities to explore broader pedagogic issues from the outset in addition to developing skills in IWB operation (p. 19). These two skills need to be explored in parallelism.

Teachers reported the advantages resulting from using IWB to enhance the delivery of instruction. Possible benefits of using an IWB for instruction include flexibility and versatility, multimedia/multimodal presentation, efficiency, supporting planning and the development of resources, modeling ICT skills, and interactivity and participation in lessons‖ (Smith et al., 2005).

Teaching via IWB also allows teachers to bring various perspectives from the outside world into the classroom through the formation of an authentic and more relevant connection to their students. Teachers have pointed out that they are more inventive, creative, and effective in their explanations when they use IWBs.

They also reported that IWB makes it easier to access a wider variety of information and learning sources which can be used flexibly and spontaneously in response to different pedagogical needs (Levy, 2002).

Besides, the use of IWB facilitates teachers‘ work; it enables the immediate collection and analysis of students‘ work in ways not previously possible. Teachers in Glover and Miller‘s(2001) study also strongly agreed with the idea that the use of IWB makes it possible, effective and easier to review, re-explain, and summarize a topic since the saved or ready examples from the previous lessons and a great variety of other sources make it easier for the teacher to re-present the subject.

As discussed, an interactive pedagogy is an important component if IWB is to be fully exploited for learning and achievement. Technical training should be reinforced by pedagogical one. This dual training should be given enough time and further enhanced and invested by getting teachers practice and develop course materials. Teachers need to experiment with new ideas and to share these ideas with other teachers. Having a collaborative and supportive environment and maintaining IWB culture should help in the transformation to an interactive pedagogy (Glover et al., 2007)

Indeed, Glover et al (2007) also maintained that providing teachers with timely technical support should help in creating IWB culture. Technical support and regular maintenance program help avoid issues encountered with teachers who would feel comfortable to have a reference whenever they face any obstacle. Even well trained and highly motivated teachers would feel frustrated if the

equipment doesn‘t work or breaks down regularly. Besides, students are smart enough to figure out the technical and pedagogic abilities of their teachers especially if teachers are somehow beginners. This results in negative impacts on the educational process altogether.

Many researchers concluded that an interactive school culture is needed in order for IWB to have the greatest positive influence on student learning and achievement. The school culture includes administrators, teachers, staff, students, and parents. The efforts and cooperation among all parties in the school culture can be demonstrated by embracing change and taking on the idea of transforming teaching and learning through IWB use. To help in creating this culture, teachers need to be given the training and time to explore IWB and its uses. This training should be both technical and pedagogical, and it should be ongoing assisting teachers in transforming teaching through the three stages of interactivity mentioned in the previous section (Glover & Miller, 2004).

With proper training, preparation, and practice time, teachers are more likely to develop confidence in IWB use, which has been shown to affect long-term motivation. Without this level of confidence and pedagogical transformation, an IWB might simply be seen as a technological tool and not a mediating artifact (Glover et al., 2007).

In another direction, IWB may assist in reducing the amount of time teachers devote to planning and delivering lessons (SMART Technologies, 2009). Although initially teachers invest time in planning, practicing and developing materials to use with IWB, time spent on lesson preparation should decrease over

time as teachers save, share and re-use lesson materials (Smith et al., 2005). Teachers recognize that time dedicated to preparing IWB lessons is not ill-used, as lessons can be reused and enhanced as needed (Levy, 2002). The ability to refine lessons rather than preparing from scratch can allow lessons to be continuously improved and updated. It is not only the lesson as initially prepared by the teacher that is saved, but also any input whether recorded during a lesson and/or written on the screen with the electronic pens can be saved and can be revisited as needed (SMART Technologies, 2009).

Levy (2002) concluded that teachers value the practical and educational benefits of saving work that is generated dynamically during classes‖ (Levy, 2002, p. 9). From this reviewed scholarly work it can be concluded that the use of IWB is beneficial for language learning as well as for procuring positive student attitudes particularly if IWB applications were well-designed and used. These findings present the changes and improvements to learning and teaching practices, the challenges to teachers and recommendations for future research.

13. Drawbacks and Barriers of IWB

Though there are many advantages presented in the literature on IWB use, disadvantages that challenge teachers and students have also been reported. Some researchers and teachers did not find IWB as a promising tool for teaching. Skeptics considered that much of this evidence on the benefits of IWB were either anecdotal or based on case studies making it difficult to generalize.

Lisi (2010), in her review of scholarly work, summarized the factors that render IWB inefficient in some cases. She classified the factors into four

categories: teacher‘s technical knowledge, availability of computer-related technology, financial barriers and acceptance of the technology. Other researchers revealed their findings in areas such as students‘ achievement.

Many researchers suggest that introducing IWB to classrooms is insufficient. Smith et al. (2005), among others, note that the skills and professional knowledge of the teacher in using IWB and manipulating its features are a major factor. Some teachers try to avoid using this technology as a result of lack of confidence in IWB use and its benefits. This can be explained as a result of their inability to cope with technical issues. If there is no support system for teachers, installing IWBs only places more pressure on teachers (SMART Technologies, 2009). Any technological tool can become a source of stress in the absence of professional development and resources (SMART Technologies, 2009).

Though training is in most cases provided to teachers at the school by the IWB companies and suppliers, it is limited in time and does not provide any updating on any new activities, supplies or material. Interviewees in Glover and Miller‘s study (2007) commented that initial training by IWB companies and suppliers with their slick presentation and high-quality prepared materials‖ were successful in firing teachers with initial enthusiasm (p. 261). The long-term value of such training, however, remains more questionable, as one teacher interviewed by Walker (2003) put it, if you don‘t catch them at the start, provide support and show them how to use learning material, their enthusiasm quickly wanes (p. 2).

This generates the need for adequate training in order to use IWB to its full potential and to surmount the various difficulties related to the practicalities of IWB use. Levy‘s study (2002), in which he interviewed teachers and students, revealed that teachers‘ inexperience in setting up equipment, wiring them, finding features on the board and manipulating these features often cause lesson disruption and waste of time. Some researchers have highlighted the frustration that teachers experience when using IWB and being impeded by their lack of practical and methodological training. IWB use must go beyond the wow factor and teachers must learn to explore the potential of interactivity for enhanced learning‖ (Beauchamp & Parkinson, 2008, p. 101). Teachers need to be convinced of the value of IWB for pedagogical purposes on one hand and should understand its nature of interactivity. Teachers need to be competent and confident in IWB use to be able to change the way they teach (Beeland, 2002). Since many teachers do not understand how to use the new technologies to their benefit or to the benefit of their students and how to integrate the new means of learning, little benefit is foreseen. Moreover, teachers may not be motivated to use IWB if it does not serve their purpose or when it adds extra work. An example of teachers‘ discouragement to use IWB is presented by Levy (2002, p. 16). He exposed the case when was used and another version of the lesson to be delivered without IWB in case IWB was not accessible.

Glover and Miller (2001) concluded that teachers will be able to use IWB to their fullest potential if they have daily access to IWBs in their own classrooms (p. 270). A similar finding is yielded from a case study conducted by Armstrong

et al. (2005). They revealed the importance for teachers to have long-term, sustained engagement with new technologies‖ before a new technology can be used to support and enhance students‘ learning to the fullest potential (p. 463).

After discussing some of IWB‘s benefits in the teaching/learning process, Moss, et al (2007) highlighted some of IWB‘s pitfalls concluding that its use did neither necessarily lead to improved teaching nor a better learning experience for students. In their study of secondary classrooms equipped with this technology, they observed that IWB attracted learners due to its novelty. However, this attraction to this new device wore off and did not motivate students as it was expected. It turned into any board they were used to.

Wood and Ashfield (2008) have also noted that in many ways, the functionality of the IWB can be viewed as a modern technological version of a traditional blackboard. In terms of learning patterns, it appears that using IWB increases the amount of time spent on whole-class activities at the expense of time for group work. Besides, it seems that the class turns into more teacher-centered rather than student-centered in case the activities are not interactive (Smith et al., 2006). Moreover, it is also time-consuming to relocate a class to different room just to use an IWB when not all classes are equipped with an IWB.

Financial issues are among the major limitations. The financial barriers that are commonly encountered include the cost of hardware, software, maintenance, and staff development. First, not all schools can afford IWB nor are they all wired to accommodate the technology (Smith et al., 2005). It is noteworthy that any advanced technology is relatively of high cost. Besides, maintenance is equally

costly especially that it is required regularly. Without maintenance, using the IWB can reach to a halt.

In the same direction, Herschbach (1994) argued that new technologies are add-on expenses and will not, in many cases, lower the cost of providing educational services. He stated that such new technologies did not replace the teachers; they supplemented teachers with easy access to virtual material. They intend to aid teachers in their pedagogical mission. In this sense, IWB did not decrease educational costs nor did it increase teacher productivity as the already surveyed literature has proved. Herschbach suggested that the time spent by students and teachers on using IWB should increase to approach the concept of cost-effectiveness.

Other problems result from the numerous difficulties encountered with IWB equipment and electricity issues in classrooms hindering the teaching/learning process. Thus, teachers need be prepared in case the IWB does not function properly and spend time planning a back-up lesson ending up completing twice the amount of work to deliver one lesson. Besides, visual problems are reported in different contexts. In one UK school, students reported their difficulty, or even impossibility, to see IWB screen when sunlight was shining directly on it. This implies that positioning of a board within a classroom and providing effective blinds are of critical importance. In addition, the height at which the board is installed can be an issue especially if young students are to use them since, most often, IWB are permanently fixed.

On the other hand, if the board is not installed and is on wheels, every time it is moved, it needs calibration. This is a major inconvenience if this process is repeated every time a student tries to use the board (Tameside, 2003).

Other technical difficulties reported include projector breakdown and difficulties with IWB system features which are seen as interruptions to successful IWB use (Levy, 2002, p. 14).

Students also acknowledge poor visibility due to inappropriate colors and fonts, poor positioning of the IWB concerning sunlight and inexperienced users of IWBs as obstacles to be overcome in IWB-based lessons (Levy, 2002, p. 14). It can lead to further displeasure when students are not awarded the opportunity to use IWBs themselves (Levy, 2002).

Students criticized the fact that there were sometimes technical problems, that it was difficult to see the boards from a distance, and that the teachers were not skilled enough in their use of the IWB (Hall & Higgins, 2005). Teachers may be hesitant to use IWB if they feel that pedagogical competency‖ is not accounted for while integrating IWB into the classroom. If teachers lack confidence and ability, perceptions can change, and IWBs can be perceived as just another presentational gimmick‘ (Glover et al., 2005). Both in Levy‘s (2002) and Glover and Miller‘s (2001) studies, some other technical problems such as lack of response of the electronic pen, freezing of the screen, and inability to manipulate certain images and symbols are mentioned.

There are, as well, many doubtful questions regarding pedagogical benefits as to what elements in software and what type of hardware will promote different

kinds of learning. Many researchers find that developing material is best done by practitioners and educators. In addition, the height at which the board is installed can be an issue especially if young students are to use them since, most often, IWB are permanently fixed.

On the other hand, if the board is not installed and is on wheels, every time it is moved, it needs calibration. This is a major inconvenience if this process is repeated every time a student tries to use the board (Tameside, 2003). Other technical difficulties reported include projector breakdown and difficulties with IWB system features which are seen as interruptions to successful IWB use (Levy, 2002).

Students also acknowledge poor visibility‖ due to inappropriate colors and fonts, poor positioning of the IWB in regard to sunlight and inexperienced users of IWBs as obstacles to be overcome in IWB-based lessons (Levy, 2002). It can lead to further displeasure when students are not awarded the opportunity to use IWBs themselves (Levy, 2002).

Students criticized the fact that there were sometimes technical problems, that it was difficult to see the boards from a distance, and that the teachers were not skilled enough in their use of the IWB (Hall & Higgins, 2005). Teachers may be hesitant to use IWB if they feel that pedagogical competency is not accounted for while integrating IWB into the classroom. If teachers lack confidence and ability, perceptions can change, and IWBs can be perceived as just another presentational gimmick‘ (Glover et al., 2005). Both in Levy‘s (2002) and Glover and Miller‘s (2001) studies, some other technical problems such as lack of

response of the electronic pen, freezing of the screen, and inability to manipulate certain images and symbols are mentioned.

There are, as well, many doubtful questions regarding pedagogical benefits as to what elements in software and what type of hardware will promote different kinds of learning. Many researchers find that developing material is best done by practitioners and educators since they are in the field. However, few educators are skilled in designing software because its development is time-consuming and costly (Thomas, 2010). In addition, choosing hardware is difficult for educational institutions because of the many choices of systems and equipment that could be used in delivering education as well as the rapid changes in technology.

The currents of change move so quickly that coping with them is not an easy task. Consequently, there is a natural tendency for teachers as well as organizations to resist change. Herschbach (1994) found that teachers tended not to use educational technology applications that required substantially more preparation time and more knowledge about diverse application especially the new applications are released on weekly basis if not on daily basis. Thus, the role of teachers will however continue to diversify as educational use of technology increases. At the same time, teachers need to stay updated, to develop digital instructional content, and to be knowledgeable and skillful in a variety of technological applications in order to meet the demand of their students. Illiteracy today is inflicted on those who do not cope with technological advancement.

Despite the many researches praising the positive effects of IWB, many questions remain as to whether these effects are simply related to the novelty

factor (Glover et al., 2007). Many of the studies were not longitudinal and were done shortly after the IWB has been introduced to the school. Therefore, the novelty factor could have been a strong influence.

Glover et al. (2007) noted that, it is only when basic technological fluency and pedagogic understanding have been achieved that teachers can overcome the novelty factor. Interaction is a significant factor in sustaining student motivation and interest and is a signal that learning is taking place (Glover et al., 2005; Higgins et al., 2007; Smith et al., 2005).

However, IWB is not always used interactively and can reinforce teacher-centered instruction on one hand. Teachers consider IWB‘s placement in front of the class while interacting with the multimedia content as an advantage to them and thus, rendering the class teacher-centered. For some teachers, interactivity is just not as important as the display of course content in multimedia modes. Armstrong et al. (2005) comment that IWB has limited impact when teachers do not realize that interactivity also requires a new approach to pedagogy.

The tactile nature of the IWB calls for interaction, yet this interaction is, in many cases, limited to teachers. Schuck & Kearney (2007) reported that many teachers had a tendency to dominate the IWB lesson without inviting students to interact with the board themselves. In their study, the surveyed primary teachers reported that students and teachers should be interacting with the IWB; however, teachers did not always follow this approach. They found that the IWB worked best when used interactively, especially when students interacted with the board themselves. On the other hand, IWB can easily be used as a blackboard

replacement. Slay et al. (2008) reinforced the idea that IWB is sometimes used in traditional ways where its value can be attributed simply to the use of a data projector and computer.

Higgins, (2010) maintained that the initial impact on tested attainment was positive, but small. However, in the long run, there was no sustained improvement in test scores once the technology was embedded in the classrooms of the schools where it had been introduced.

Levy (2002) cautioned that the IWB is not to be mistaken to bea guaranteed cure for boredom either. He considered that an overextended presentation is still an overextended presentation, with or without an IWB as the medium for delivery. Although an IWB can help students understand lesson objectives, it can also become a boundary to understanding because traditional media or techniques are sometimes more straightforward.

This contradiction in findings regarding students‘ achievement is due to the fact that there are no absolute properties of an IWB that would allow one to predict the effects they have on learning (Armstrong et al., 2005). In fact, it is not clear as to how IWB use might affect learning outcomes or concept development (Schuck& Kearney, 2007). (Glover et al., 2007) maintained that the use of IWBs alone cannot lead to enhanced learning. The teacher, not the technology, is still the most important element in student learning. Besides, many studies were done in schools where IWB was a new addition to the classroom. A key factor to keep in mind is that IWB is an intercessor artifact.