

Acquiring ESL (English as a Second Language) Mediated through Technology – a Sociocultural Perspective

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Abstract

Technology has emerged as a pivotal tool in mediating teaching and learning for its nature of being interactive, distributed, and collaborative (Bonk & King, 1998). In addition, the computer provides the beginning learner with a sense of security as well and it finally leads the learner's independent work (Bradley & Lomicka, 2000). Therefore, many other researchers stress the importance to implement technology in teaching English as a second language (ESL) (Schick & Walker de Felix, 1992; Anderson & Speck, 2001).

This ethnographic case study examines what features of technology enhance her as a novice ESL learner's acquiring writing in a classroom, and how technology mediates her learning. The participant, the researcher's eight-year-old daughter, whose native languages are Taiwanese and Mandarin, arrived in the U. S. three months prior to the start of this study. . This study looks at the technology she applies to help her acquire English and accomplish some of her school instances, such as the author study, and the process technology mediates her learning within and outside of school. Ethnographic approaches - participant observations, interviews, artifact collection and photography – are utilized to answer the research questions.

The emerging findings show that technology offers different helpful features from the traditional printed texts. They are interaction, circularity, repetition without boredom, audio/visual effects, animated pictures/graphics, and written words. The ways how technology mediates the learning process are memorizing, decision making, information/context providing, interest/motivation recruiting, and culture orienting. The implications are also reported as advice for teachers who have such students in their classrooms.

Acquiring ESL (English as a Second Language) Mediated through Technology – a Sociocultural Perspective

Technology has emerged as a pivotal tool in mediating teaching and learning for its nature of being interactive, distributed, and collaborative (Bonk & King, 1998). The computer has become a powerful tool to mediate second language learning because it provides the beginning learner with a sense of security as well and it finally leads the learner's independent work

(Travis & Lomicka, 2000). Therefore, many other researchers stress the importance to implement technology in teaching English as a second language (ESL) (Schick & Walker de Felix, 1992; Anderson & Speck, 2001).

In the classroom with various levels of English proficiency, the teacher should ideally take the time to work on one-on-one efforts with to help them achieve proficiency-level appropriate English proficiency (Wu, 2002). However, in reality, this individualized attention is not always feasible. In the average classroom, a teacher instructs and manages 30-40 students without support from teaching assistants and community volunteers. In making up the insufficient one-on-one assistance, technology could play a complementary role to enhance learning both English and content-area subjects in the classroom and at home. In addition, the rapidly expanding presence of digital texts in increasingly diverse areas of daily life including school makes the mediation of technology and multimedia in language learning timely and potentially a necessity for ESL learners.

The purpose of this study is to observe in-depth what features of technology assisted a novice ESL child learner in acquiring her English, and how these features mediated her process of language acquisition. Therefore, the research questions that guide this study are:

1. What features of technology enhance a novice ESL learner's acquiring English in a classroom and at home?
2. How does technology mediate the acquisition process?

Theoretical Framework

The study is influenced by Lev Vygotsky's sociocultural theory. A primary tenet of his theory is that individual mental functioning is inherently situated in social interactive, cultural, institutional, and historical contexts (1978). Therefore, to understand human thinking and learning, one must examine the context and setting in which that thinking and learning occurs. Individual learning and development is dependent on the institutions, settings, and cultural artifacts in one's social milieu. The tools and signs one is exposed to, therefore, influence or mediate new patterns of thought and mental functioning (Wertsch, 1991a). Such mediating tools and signs may be languages, mathematical symbols, drawings, artwork as well as software graphics, electronic messages and web pages. As technology advances to become "the most powerful and pervasive cultural tool" in many institutional settings, the available mediational means that can impact cognitive functioning also change (Werstch, 1991b).

Another tenet of Lev Vygotsky's sociocultural theory is Zone of Proximal Development (ZPD) (1978). ZPD is defined by Vygotsky as "the distance between

the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (p. 68). This study draws heavily upon ZPD, and technology is considered a more capable peer because of its utilization of multisensory collection of text, sound, pictures and animation to facilitate comprehension (Butler-Pascoe & Wiburg, 2003). In addition, it also provides modalities to meet the needs of students with different learning styles from various cultural backgrounds (Butler-Pascoe & Wiburg, 2003), and it further mediates new patterns of thought within the participant’s ZPD.

Vygotsky’s concept of ZPD is particularly helpful in interpreting the ESL learning of this study because the participant’s novice status in both language and social/cultural practices in American schools suggests she needs more experienced others to interact with to enhance her development of English language and social familiarity. Sound, images, pictures are rich in providing contextualization for her making meaning of language and subject-area matter. Hirsch (1989) also explained that the most effective instructional techniques include drama, music, and a variety of visual experiences.

The present study is also influenced by Howard Gardner’s multiple intelligences (1983) because of the characteristic of varied sign systems in technology. MI’s central claim is the existence of a diversity of representational codes or languages of the mind. Taking the same position, John-Steiner (1997) calls the concept “cognitive pluralism.” The theme that links their work with this study is a shared emphasis on the breadth of human competences. Technology certainly presents more varied stimuli to human beings with various and multiple sign systems than traditional printed texts. Some examples of these varied sign systems are sound, animated pictures, and hypermedia.

Literature Review

Definition of Literacy

The vision of using technology to teach literacy is connected to the understanding of what it means to be literate. The New London Group (1996) defines literacy in terms of multiliteracies or dynamic, interacting text forms for the construction and reconstruction of meaning to account for the increasing cultural and linguistic diversity in the American society. In addition to this definition of multiplicity, this group of scholars also argue that the definition of text forms should go beyond the written word to include various sign systems including visual images in multimedia technologies, due to the evolving demand of these systems utilized in the multimedia and Internet for workplaces. Therefore, many scholars also call for the

need to expand our definition of literacy to regard it as a social process that is dependent on social and cultural contexts (Flood and Lapp, 1995; Gallego & Hollingsworth, 2000; Lankshear & Knobel, 2003; Leu, 1997; Reinking, 1995). They argue that the presence of digital texts is expanding rapidly in increasingly diverse areas of daily life, so being literate will require students to possess new and increasingly sophisticated navigational strategies and to continuously update their abilities to communicate within new technologies. One of the evidences for the extensive use of digital texts is that traffic on the Internet doubles every 8-10 months (Reinking, 1995). In this study, literacy shall be defined as making meaning from multiple text forms and as the process of negotiating the varied semiotic systems prevailing in multimedia technologies. The following literature review focuses on utilizing technology as a mediating tool in learning a language.

Technology as a Tool in Learning a Language and Literacy

For this study, technology is not narrowly defined as a replacement for traditional books used for instruction in the classroom (Reinking, 1992). Instead of comparing technology with a traditional printed book in producing comprehension and learning, the purpose of this study is to examine the technological capabilities afforded by tools other than printed books in problem solving. With regard to the characteristic capacity of technology in language learning, Pusack and Otto (1997) point out the factors of its promising application in language learning: (1) the ability to portray the target language and culture accurately, (2) the capacity of providing learners with control over the media and feedback concerning their actions, and (3) theoretical and methodological advances that put input and intake of language at center stage in the language-acquisition process.

In evaluating the effectiveness of a medium in assisting listening to a second language, an often used criterion is the medium's ability to provide the fullness of face-to-face communication, which is characterized by "presence", including immediacy and interactivity-feedback and response (Purdy, 1996). Some interactive multimedia programs have been designed and scripted in such a way that the listener becomes an active participant in a simulated adventure. Their implications in the classroom include bringing additional voices into the classroom, conserving the teacher's energy, arranging for different listening activities to suit individual needs, and separating the visual and verbal messages of video and edit texts (Joiner, 1997).

A plethora of articles elaborate how technology provides various types of assistance in reading. These types of assistance include providing adaptive guidance and feedback (MacGregor, 1988), exploring the effects of nonlinear reading (Spiro, et al., 1992), presenting textual information electronically under conditions aimed at affecting readers' strategies (Reinking, et al., 1996), and using auditory and visual

effects made possible by the computer (Hegarty, et al., 1991). Furthermore, Reinking (2001) argues that digital texts are unique in helping to create conditions that promote reading engagement. These conditions include active orientation to texts, easy rather than difficult reading, fulfilling a broad range of needs, and reading as a creative and playful activity. In his 2-year research project, Reinking (2001) concludes that involvement in creating multimedia book reviews increases the amount of students' independent reading across the schools and classrooms. With the prevalence of the World Wide Web, reading digital texts has become part of the modern life. Thus, it is urgent for classroom teachers to exploit the use of technology to assist their students, both native speakers of English and those who have English as their second language.

The impacts that technology can bring to students are varied as well. Valmont (2002) states that the existence of technology is changing the nature of writing as it is changing that of reading. He points out just few changes among many: verbal and nonverbal presentations, ease of printing and distribution, existence of authentic audience, and multiple symbolic systems. In addition, technology can move the process of writing from teacher-centered instruction to student-centered exploration (Bonk & King, 1998).

Methods

This qualitative case study (Merriam, 2001) took place from October, 2002 to May, 2003. The selected case study format is designed to get an in-depth understanding of the features of technology that enhanced a novice ESL child learning English in a classroom and at home and how technology mediates this learning process involving multiple sources of information (Creswell, 1998).

Multi-Settings

School/Classroom. This study takes place in the home and school environments of the participant. This participant's school, Nelson Elementary School, is a small school with 284 students. In the participant's classroom, there are three computers – one Mac and two PCs. The computer lab, belonging to the whole school, consists of twenty or so computers and a few printers. The class teacher sends the class to the computer lab to research for information occasionally and assigns homework that requires the students to search for information on-line.

Home. The participant's home is an international graduate student family situation. Yin's¹ father stays in Taiwan, teaching in a university. Her mother is enrolled in a doctoral program at a large research-oriented university in the

¹ A pseudonym is used.

southwestern part of the United States. This mother spends a large amount of time working on the computer – searching for information for academic use, writing papers, reading daily news from Taiwan, etc. Yin also has an elder brother, eleven years old, who goes to a full time GATE (Gifted and Talented Education) program in a middle school. He came to the United States with the mother a year before Yin arrived and has become a comfortable user of the computer and owns some CD-ROMs such as *Sim-city* and *Oregon Trail*. Yin and her brother interact when they play the computer games or surf on the Internet together.

Participant

The participant, Yin, is the nine-year-old, third grade daughter of the researcher. Her first language is Taiwanese and her second language is Mandarin. She arrived in Tucson in June 2002. Her English is limited because the teaching of English in her home country, Taiwan, begins in the fifth grade. She is new to both English and the American school system. Her novice status in English and the available access to various kinds of technology both in school and at home make her a valuable informant in answering the research questions posed in the study.

Data Collection

To answer the research questions, *what features of technology enhances a novice ESL child acquiring English in a classroom and at home, and how does technology mediate the acquiring process*, I applied multi-site observation (Marcus, 1995 & 1998; Bogdan & Biklen, 2003). I was a participant observer (Spradley, 1980) both in school and at home. During the school visits, I observed the reading and writing sessions which lasted approximately one and one half hours in her classroom at least three days a week. At home, the researcher, as the participant's mother, spent much time with Yin, helping her with homework, observing her interaction with her brother. After Yin and her brother went to bed, the researcher kept a journal of the talk and observation.

In addition to observation, I conducted two thirty-minute semi-structured interviews (Merriam, 2001) with the participant. The researcher took pictures (Bogdan & Biklen, 2003) of the participant when she utilized technology at school and at home. These pictures were useful since the interviews were held in March; the memory of what happened months ago could be unclear to a child. The researcher interviewed the participant in Mandarin Chinese since the participant's English was still basic and it is the language used in the family.

Each interview was audio-taped and transcribed.

Data Analysis

The constant comparative method (Lincoln & Guba, 1985) was applied to analyze the data in this study. I underlined all the relevant words and phrases in the

observation notes and interview transcripts while I was open to other words or phrases that especially stood out. I compared and contrasted all of these to check for emerging themes.

Findings

As stated earlier, the purpose of this study is to examine what features of technology enhanced Yin's acquiring ESL, and how these features mediated this acquisition process. In answering the first research question, *what features of technology enhanced a novice ESL learner's acquiring English in a classroom and at home*, five tools emerge as the most useful to her from the researcher's observation and interviews with Yin. They are *Oregon Trail* (an interactive computer game), video tapes, audio tapes, overhead projectors and the Internet. The features characterized by these tools are interaction, circularity, repetition without boredom, audio/visual effects, animated pictures/graphics, and written words (see Table 1). Regarding the second research question, *how these features mediated Yin's acquiring process*, four themes emerge: memorizing, decision making, information/context providing, interest/motivation recruiting, and culture orienting (see Table 2).

Interactive/Circular

As shown in Table 1, *Oregon Trail* and the Internet provided Yin with the opportunities to interact with the texts and animated pictures in them. She described in playing *Oregon Trail*, "When your people get sick, you have to know how to use herb and medicine. [By doing this], you get some knowledge of herbs and medicine." Unexpected accidents along the trail like this prompted her to interact with the written and spoken words in the game. She could also enter the fort and purchase things. There were characters outside of the fort. Yin could choose to listen to them talking by clicking on them. After Yin clicked on a character, there were four buttons showing the options, "Tell me more", "Do you have any advice?", "Pardon?" and "So Long". By clicking on the button of "Tell me more", Yin got more choices to make: "Do you have any advice?", "Pardon?", "So Long" and "Would you like to trade?" In this process, Yin could keep interacting with this character, or she could quit by clicking on "So Long" and continue the journey.

With regard to the Internet, Yin used it regularly such as when she needed information for school projects such as State Report and Author Study. They were two major semester-long projects in the 2002-2003 academic year. In the fall semester of 2002, Yin had to select an American state to research and report on; similarly she did a research on a chosen author in the spring semester of 2003. She used the key words on some websites to help her find information. She described her experience in searching for books for her Author Study Project, "I saw the 'Title' and 'Author' [in the home page of the local library]. I clicked on them. And I

found the information I needed.” Conversely, Yin did not find the graphics icons on this library website helpful to her because she did not really know what they represented.

Another feature of the two tools that were different from the traditional books, *Oregon Trail* and the Internet, was their circularity instead of linearity. Both tools had links on each page and they enabled Yin to travel back and forth among the links. She did not have to approach the text in a linear way as she did in reading a traditional book. The feature of nonlinearity made it flexible for Yin to apply reading strategies as she commented, “Reading in the computer is fun and convenient. I can make my choices by clicking on the button [or the key words] and go to the link immediately. Unlike the [traditional] books, I have to flip over the pages to find the information I need.”

Repetition without Boredom

Another technology feature that Yin found different from the printed books while helpful in her learning English was *repetition without boredom*. Yin stated that the repetitive words in *Oregon Trail* helped her in learning a large number of vocabularies relating to the traveling such as *fishing net, wagon wheel, wagon, clothing, salt, etc.* She further contrasted her way of learning from *Oregon Trail* with learning from the tradition printed books in her statement:

[When you read the traditional books], you get tired after encountering them (the words) for a few times. However, when you play *Oregon Trail*, it is fun.

Because you have the [real] necessity in buying the fishing net, you keep reading ‘fishing net’, and you remember it. (Translated from the interview in Chinese)

Yin found the repetition of words also especially helpful in video tapes, audio tapes, and the Internet. She stated that watching video tapes also helped her in learning more vocabulary words. She said, “When I came to the words I didn’t understand when I was watching video tapes, I asked my brother, and I remembered them. The words would be useful in the future.” In their music classes, the class teacher taught them some songs by playing the audio tapes. For example, Yin and her classmates learned “Lion King” through this method of instruction and interaction. By repeatedly playing the songs many times, Yin finally memorized the whole song. In her interview, she explained that she came to understand the meaning of the words by listening and singing the song so many times but, even after repeatedly hearing it, she still remained interested in singing the song.

When she was seeking information on the Internet for her Author Study Project, she had to type in the author’s name she was studying. Though she had to type the author’s name many times, she did not feel bored because there was a goal for her to do this – collecting the bibliography of the author’s books. This suggests that

repetition differs from drills because the child has a purpose for being engaged in this action.

Audio/Visual Effects

The audio and visual effects of these tools impressed Yin as she was using *Oregon Trail*, video tapes, and the Internet. At the very early stage of her learning English, the class teacher played some simple stories in the tape player for her. She enjoyed the rhymes and songs in the story and kept singing them at home. In *Oregon Trail*, the way she interacted with people in the store or fort made her feel like “talking to” them. She explained how the various accents of these characters gave her interesting stimuli and an understanding of the various accents and dialects of English in the United States, and further claimed that the emotional expressions of voice in these people’s speech made her feel interested and want to go on playing.

In addition, the video tapes helped her in improving her listening because they repeated some of the characters’ sentences. In other instances, Yin exhibited signs of modeling what she had learned through various technological media. For example, after watching the *Lion King* on video tape, Yin would repeat the key sentences or phrases for days. “Simba, I am very disappointed. You deliberately disobeyed me!” a sentence that Mufasa said to his son in the movie. Then she inserted these sentences into interaction with the researcher and with her brother showing she could apply what she learned to everyday situations.

Picture/Animation

Another technological feature that made Yin feel interested is animated pictures. She particularly enjoyed watching animated cartoon video tapes. She stated that video tapes were much more effective in helping to improve her listening than audio tapes because she felt that pictures and the characters’ facial expressions in the video tapes made it easier to guess the meaning and the plots. In addition to video tapes, Yin was amazed by the pictures and graphics in *Oregon Trail* as well. Once she commented, “The appearance of the woman makes her look like a mean person,” when she was playing *Oregon Trail*. In the animated scenes of *Oregon Trail*, Captain Jed, the trail guide, told a story to the children, who traveled with him, next to a campfire with music. The scenes and stories gave Yin a better understanding of life on the trail and make these travelers’ experience in the simulation adventure more engaging and meaningful to her. However, she did not think that the animated graphics on the Internet helped her in any way.

Written Words

In the researcher’s previous study (Wu, 2002), she found out that viewing written words helped Yin in understanding what was going on around her in the classroom. The observation and interviews in this study further confirmed this finding. Yin

recalled that the teacher would copy the words of a song on a transparency and project it onto the wall during the music lesson. She described, “In the music time, the teacher showed the words with a machine. If I couldn’t understand the words from the singing, I looked at the words and I understood them.” As mentioned previously, the key words on the websites of the public library helped her to locate the page she wanted efficiently. Written words facilitated her understanding on many occasions in the classroom as her listening in English was not fully proficient.

Table 1. Features of the tools that enhanced Yin’s acquiring ESL

	Oregon Trail	Video tapes	Projector	Audio tapes	Internet
Interactive/circular	x				x
Repetition without boredom	x	x		x	x
Audio/visual effects	x	x		x	x
Picture/animation	x	x			x
Written words	x		x		x

X represents the features each tool possesses.

These findings showed that the above tools and their features of technology effectively enhanced Yin’s acquiring English. Furthermore, the following section will focus on how these tools and features mediate this acquiring process (see Table 2).

Memorizing

Oregon Trail showed a strong tendency in helping Yin memorize words. As I have mentioned in the section of *repetition without boredom*, she confessed that the continual need of the player to get the *fishing net* for fishing repeated the phrase “fishing net” until she finally remembered the term. This same learning process took place with many other words and phrases as Yin went on the journey. The same thing happened when she was seeking information on the Internet for her Author Study Project. Because Yin had to repeatedly type in the author’s name she was studying, she remembered the spelling of the author’s name. She also remembered the key words of the website of her local public library system such as “Title” and “Author”.

In addition to Oregon Trail and the Internet, video and audio tapes helped her memorize words too. However, because there was no written word on these tapes, the memorization of words, phrases or sentences centered on listening. The accumulation of understanding English increased her interaction with the teacher and peers in the classroom and made this interaction more comprehensible.

Decision Making

The interactive and non-linear features made technology significantly different from the traditional printed books because they involved her in decision making. In *Oregon Trail*, Yin had to decide what name and profession to own, what supplies to obtain, and where to obtain them. While the trail, she needed to monitor the health of the wagon party and keep track of the supplies. When she encountered physical obstacles such as rivers, deserts, and hills she had to find ways to overcome these obstacles by consulting the Guidebook, talking to other characters she met on the trail, or visiting the Montgomery family and learning about their adventures. These decision-making and problem-solving processes provided her with opportunities to interact with “more experienced ones” such as the Guidebook, the people on the trail, or the Montgomery family, and the interaction is considered crucial for children’s development in the theory of ZPD. In addition, the option of “talking to” the people on the trail made Yin an active participant in this interaction and provided simulated “presence” and “face-to-face” communication” proposed as effective in assisting listening to a second language by Purdy (1996).

The Internet also offered opportunities for her to make decisions as well. For example, as she worked with the library’s online catalog, she had to decide to enter from *Title* or *Author* in order to gain the call numbers of the books related to the author she was studying. In another example, as Yin prepared to write the author’s biographical information, she used the search engine, Google, which provided her with hundreds of links that required her to choose what to read and what was pertinent to her report. By doing these activities, Yin was deciphering the complexities of the English language.

Information/Context Providing

Cummins (2000) has long concluded that “in context-embedded communication the participants can actively negotiate meaning and the language is supported by a wide range of meaningful interpersonal and situational cues” (p.68). Playground conversation with peers is the most context-embedded situation and thus the least cognitively demanding because it has body gestures, facial expressions and voice tones to make meaning easy to guess and thus comprehensible, while reading texts will be on the other extreme – context-reduced. However, if language learners have enough contextual support, they will have more cues (Goodman, 2001) to make sense of the text.

In this study, the researcher found that the Internet provided Yin a huge amount of information in collecting the author’s biography and books, and the website of the public library system gave Yin immediate access to search for these books. In spite of her limited English proficiency, she could locate the information she needed effectively. She told me that she simply tried out all the optional buttons on a

website and saw which linked to the information she needed. After a few times of trying, she would find the correct one. For example, on a local library website, she clicked on “Main and Branch Library Information”, and a list of branch libraries dropping down. She applied her basic phonemic awareness and looked for the name of the library that started with “H”. After she clicked the one, “I saw the picture and I knew it was Hime Library,” Yin exclaimed.

She also informed the researcher that she understood the plots in the videotapes because they had animated pictures and the characters had facial expressions and various tones when they spoke. All these features, key word on a website, animated pictures, facial expressions and voice tones, helped to provide more cues other than written words for her make sense of the meaning by the strategies of guessing, confirming, and modifying.

Interest/Motivation Enhancement; Cultural Orientation

When Yin described her experience in utilizing these tools, CD-ROMs, video/audio tapes, an overhead projector and the Internet, a main theme that kept her going was that they engaged her interest. It was obvious that the features of interaction, audio/visual effects, and animated pictures/graphics all contributed to the recruitment of her interest and motivation by meeting various functions which ranged from recreation to the accomplishment of homework. *Oregon Trail* was an important form of recreation which manifested itself in a variety of ways in her daily life. Not only did Yin play it on the computer, but she also explored the experience of the western settlers’ lives in her drawing, by playacting out roles with her brother and by reading other books describing the western pioneers’ lives. Video tapes were also an established form of recreation. It has become a family routine to rent one or two tapes to enjoy and relax on the weekend. Similarly, in classroom music lessons, Yin enjoyed listening to the music the teacher played. The songs were repeated so many times that she could sing some songs from memory to amuse herself. This recruitment of Yin’s interests and motivation immersed her in the environment of English and brought her a large amount of comprehensible input while she did not feel pressured. This is what Krashen describes as the most effective environment for a second language learner to acquire a language (Krashen, 1985).

In addition to interest and motivation, these tools served as resources to orient her with American culture. Through playing *Oregon Trail*, she has become more knowledgeable on the history of the Western immigration including their food, clothing, ways of talking, and the geography from Missouri to Oregon. As the computer game sparked her interest in the western expansion, Yin became further motivated to watch relevant video tapes. Thus, this interest engaged her in study both the language of English and the history and geography of the United States. As

she explored her new interest, Yin broadened her understanding of this country and its culture. This might give her the necessary connections she needs to help her transition into a new school system and to provide her with common areas of interest when interacting with peers, traits that would assist in her cultural assimilation in the American school.

Table 2. Ways how the tools mediate Yin's process of acquiring ESL

	Oregon Trail	Video tapes	Projector	Audio tapes	Internet
memorizing	x	x	x	x	x
Decision Making	x				x
Information/Context Providing	x	x			x
Interest/Motivation Recruiting	x	x		x	x
Culture Orienting	x	x			x

X represents the features each tool offers.

Conclusion

Technology has become such an essential part of modern life. It mediates children's learning in multiple ways when contrasted with the traditional printed texts. ESL children generally need extra support in English when they face academic challenges as well as language barriers. Therefore, the purpose of the present study was to examine how technology can enhance and accelerate ELL's acquiring English, so they could catch up to the native peers in the subject matter. The findings focus on various tools, CD-ROMs, video/audio tapes, an overhead projector and the Internet, and the multiple ways each mediates the process. Their emergent mediating ways are memorizing, decision making, information/context providing, interest/motivation recruiting, and culture orienting. The findings serve as evidence that technology possesses powerful potentiality in assisting ESL learners.

Implications

The implications of the findings concluded in the present study are numerous. Implementing technology in teaching and learning is not necessarily expensive. Yin's class teacher is not particularly technology-oriented in teaching. She simply uses what is available in school. Yin's family is that of a typical international graduate student, which definitely cannot afford too much investment in technology implementation at home. However, the teacher and the parent simply make good use of the available resources at home, at school and in the community.

At the present stage of insufficient ESL knowledge and experience in both pre-service and in-service teachers, technology serves a crucial role in providing context-rich texts, comprehensible input, and level-appropriate tasks to ESL learners in classrooms. Of course, the implementation of technology in assisting ESL learners should not prevent them from interacting with the teacher and peers. The assistance of the teacher and peers are also important in enhancing their acquisition of English; and these factors will require further examination.

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