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Technology use in ESL: An investigation of students' experiences and the implications for language education

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In Australia, information and communication technologies (ICT) are a significant element of a multicultural and multilingual society. However, some people (in particular, international students, immigrants, refugees) may experience many challenges because they use technology in English as their second language (ESL) and in a new sociocultural environment. Informed by a sociocultural perspective and Bill Green's 3-D model (Green, 1988), the study views technology as a complex social, multimodal, and multidimensional practice which requires relevant capabilities—technoliteracy. The case studies focus on four international students and their experiences with technology use in ESL. This paper introduces five interrelated categories of challenges—navigation, comprehension, application of discourses, critical analysis and the affective domain. It also outlines the capabilities required for technoliteracy practices in ESL—the English language capabilities, ICT capabilities, contextual capabilities and critical capabilities. The discussion focuses on the need for educators to rethink the use of ICT in a language classroom.

Keywords: *ESL; ICT; literacy; tertiary*

Introduction

The use of information and communication technologies (ICT) in ESL education is often seen as a tool to promote the development of language proficiency and as a teaching aid to achieve certain educational goals. Undoubtedly, technology may offer access to new activities and materials, and may increase students' interest and motivation, making learning more effective. However, such an approach to technology is limited, especially when considering that ICT use in English for everyday life, learning, work, and entertainment has become a common activity for many people

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around the world. A number of researchers argue that technology use requires a set of literacy capabilities which needs to be developed through formal teaching as a contemporary form of literacy (Lankshear, Snyder, & Green, 2000; Murray, 2000; Warschauer, 1999). Much of this research has focused on first language concerns. By contrast, the research to date on literacies associated with technology use in the context of second languages is not extensive and lacks a holistic view.

The present study contributes to existing knowledge in the field by investigating how four students engaged with technology in English as their second language in the context of their everyday life and learning in Australia: what technologies the students used, for what purposes, and what literacy practices were associated with ICT use in ESL that the students participated in. Furthermore, the study examined why learning and teaching technoliteracy might represent a challenge for students and their teachers—what difficulties the students experienced with using technology in ESL and why. This study aimed to provide a better understanding of the students' needs in terms of literacy associated with technology use in ESL and how they can be addressed in education. The findings presented in the paper draw on one aspect of the study only; namely, students' challenges and the nature of those challenges.

Conceptual framework

Given that this study sought to research technology use in ESL from a literacy perspective, the conceptual framework explains the concept of literacy, discusses the relationship between literacy and technology, and suggests an approach to their investigation as a whole.

Literacy and second language learning: A sociocultural perspective

For many years literacy has been understood as being able to read or write printed texts, with teaching literacy informed by the "autonomous" model (Street, 1999) in which it is seen as a neutral tool for achieving different tasks. However, according to Gee (2000), the recent "social turn" (p. 180) in many disciplines has shifted the focus from behaviourism and cognitivism to sociocultural interaction, emphasising the importance of social and cultural contexts. New Literacy Studies (NLS) (Barton, Hamilton, & Ivanic, 2000; Gee, 1991, 2000; Hamilton, 2002; Pahl & Rowsell, 2005; Street, 1995, 1999) is one movement that has followed the "social turn" and represents a socioculturally, historically, and politically

based approach to literacy. Its main direction is based on the belief that "reading and writing only make sense when studied in the context of social and cultural (we can add historical, political and economical) practices of which they are but a part" (Gee, 2000, p. 180). This view that literacy is a sociocultural contextual practice draws attention to the close, interconnected, and intricate relationships between language, literacy, culture, Discourses (Gee, 1990), identity, and power (Gee, 2000; Hamilton, 2002; Pahl & Rowsell, 2005). Such understanding seems relevant to all literacy forms, including second language literacy, as well as oracy which is closely related.

Second language learning is a complex phenomenon which covers both the development of the target language together with a knowledge of sociocultural practices (Hinkel, 1999). It also aims to develop both literacy and oracy or, in other words, the four key language skills: reading, writing, speaking, and listening (Chastain, 1988; Horwitz, 2008). Similarly, with the development of the view of literacy described above, educators' understanding of second language has shifted from the behaviourist view that considers second language learning as an autonomous field of enquiry, to the sociocultural view that has become popular today (Mitchell & Myles, 1998). This suggests that native and second languages are cognate fields; that language use is embedded in different contexts and inextricably connected with a wide range of associated issues is an idea central to both of them (Lantolf, 2000; Mitchell & Myles, 1998; Warschauer, 1999).

Language, literacy, technology

Historically, literacy, as a human activity and social practice, has undergone many changes associated with the use of technologies (Bruce, 1998; Snyder, 2008; Warschauer, 1999). As Snyder (2008) argues in *The Literacy Wars*, "today, as much as in any other historical period, new literacy practices are emerging and the concept of literacy continues to change as it has always done" (p. 216). Literacy, which is "expansive" (p. 182), should develop according to the needs of the Digital Age society—participation in networked information and communication practices. No longer can the concepts of "technology" and "literacy" be separated. Drawing on the NLS and the relationship between social practices and literacies, Lankshear et al. (2000) recognise technology as "a social practice" (p. 32) and suggest *technoliteracy* as an emerging form of literacy. They define technoliteracy capabilities as "being able to

decode and encode fluently; using literacy abilities and understandings involved in researching and reporting information; reading and deciding what is relevant; notetaking; scanning, and collecting information in a selective way" (p. 25). The use of new technologies does not mean that traditional print literacy practices are replaced; they are, rather, altered to meet the needs of people.

The use of technology in second language education has a long history. The term "CALL" (Computer-Assisted Language Learning) has been used to discuss the role of technology in language learning and teaching for many decades (Cameron, 1999; Egbert & Hanson-Smith, 1999; Gruba; 2004; Levy, 1997). Recently, CALL has been questioned by some researchers because its directions—using technology for improvement of language proficiency—are not enough when technology is highly integrated in many people's everyday lives (Bax, 2003; Kern, 2006; Warschauer, 1998, 1999). Warschauer (1998) introduces the term "electronic literacy" (para.10) and differentiates it from a CALL perspective: "an electronic literacy perspective … asks how to teach language to promote online reading, writing, and communication skills" (para.10). Warschauer (1999) also emphasises the importance of electronic literacy in the context of learning English as a second language, and draws on the important overlap between these two fields in a globalised world. Warschauer's definition was made more than a decade ago, and today, it certainly needs revising. First, it is necessary to acknowledge the rapid development of ICT and the multimodality of texts and practices in a technological environment. Further, current pedagogy integrates new approaches to literacy (e.g., critical literacy) proposed by Street (1995, 1999), Gee (1991), Green (1988), and Luke and Freebody (1999) more and more into practice. This suggests the need to discuss the concept of literacy associated with technology use in ESL in a more detailed and explicit way.

The term "technoliteracy" is broad enough to convey many ICT associated practices and necessary capabilities. Thus, drawing on the theoretical foundations of literacy research and the changes in the modern world, ICT development, and pedagogical practices outlined above, the concept of *technoliteracy* in the context of ESL education refers to an approach which suggests how to teach English as a second language in the Digital Age. The aim of this approach is to promote the development of a wide range of capabilities so that ESL students are able to deal with multimodal texts in a technological environment in both written and oral ways; they can access, use, comprehend, analyse, evaluate, develop

critical understanding, create, and engage in communication and other activities in their personal and professional lives appropriately and successfully.

3-D model as a research perspective for technoliteracy

A sociocultural understanding of a literacy informed by the NLS resulted in a number of approaches to teaching literacy that have been promoted throughout Australia (Snyder, 2008). The Three Dimensions Model (3-D Model) (Green, 1988) is one of them. According to Green's holistic view, literacy as a practice comprises three interlocking dimensions: operational, cultural, and critical (see Figure 1). Each dimension deals with different aspects of literacy and involves different skills and knowledge. Together they represent integrated literacy capabilities.

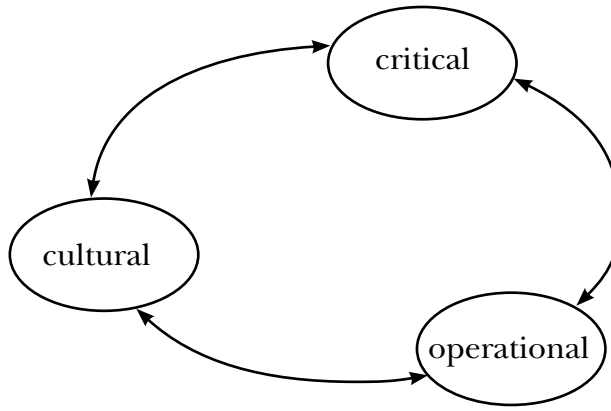

Figure 1. 3-D model of literacy (Durrant & Green, 2001, p. 152).

The *operational* dimension refers to the language aspect of literacy or "competency with regard to the language system" (Green, 1988, p. 160)—a knowledge of the language system, its symbols and rules, as well as the ability to make the language system work. The *cultural* dimension engages "the meaning aspect of literacy" (Green, 1988, p. 160), and is about understanding/producing meaning in an appropriate way with regard to some knowledge or experience. The *critical* dimension of literacy deals with the social construction of knowledge and all kinds of practices. It involves the transformation and active reproduction of existing literacy practices or discourses, and developing the ability to critique, evaluate, and redesign the resources.

Lankshear et al. (2000) promote Green's 3-D model for understanding technoliteracy and its complex structure. It is an

approach which brings together all dimensions equally to both literacy and technology, and considers skills, different contexts with related issues, and the non-neutrality of technology and texts. The model has informed a number of studies on native literacy practices in technological environments which have provided arguments for the 3-D model comprising a valuable framework for technoliteracy research and teaching (Beavis, 2001; Lankshear et al., 2005; O'Mara, 2006). The model has a well-organised structure which suggests that it is suited to investigate thoroughly how learners engage in literacy practices in a technological environment within and across its dimensions.

In this study the 3-D model informed the understanding of ESL practices in a technological environment in the following way. Within the operational dimension, special attention was given to ESL proficiency, encoding and decoding for meaning making in written and oral ways, and basic technological skills. The main focus within the cultural dimension was the appropriateness and inappropriateness of the practices in a given context. The critical dimension dealt with the students' engagement with ICT in a critical way: their ability to challenge, critique, question technology and its resources, meanings and associated practices, as well as their social awareness and commitment to transformation of existing technoliteracy practices.

Methodology

This qualitative study involved a class of international students studying a Computer Study Skills Module and their teacher at Briston University English Language Centre (pseudonyms have been used throughout this paper for all names and identifiers), located in Melbourne, Australia. The research focused on four international students from Thailand (Kate), China (Chen Lin), Saudi Arabia (Ahmad), and France (Pierre). Informed by a constructivist paradigm, the research followed a multiple holistic case-study design where each participant was a case with the overall study interested in all four cases (Yin, 2003). Classroom observations, participants' diaries of their ICT use, and individual interviews were used for data collection, and data analysis was informed by the NLS and the 3-D model.

Findings

The findings demonstrated that in Australia, the participants used a wide range of technologies for many purposes. However, coming

from diverse sociocultural, linguistic, and educational backgrounds, they had different attitudes to ICT use and experienced many contradictions and challenges. In this section, five interrelated categories concerning the challenges that students faced are presented, with some interview extracts as illustrative examples within the available space restrictions of this single paper. The language in the examples is as spoken by the participants.

The categories of challenges that were identified are: navigation, comprehension, applications of discourses, critical analysis, and affective responses. The borders between them are blurred; they often inform and influence each other and this makes it problematic to identify them as separate issues. Nevertheless, activities associated with them have different aims. In addition, they involve different technoliteracy practices which, in fact, represented the diverse challenges for the participants and were the research focus. These considerations and theoretical orientations informed the categorisation.

Navigation

Navigation is a pathway individuals take to access information and/or functionality in a technological environment. Failure to achieve functionality and access information (partially or completely) in a technological environment was the main challenge the participants faced when they used different software, operated personal devices, and visited a wide range of websites.

Ahmad on navigating a GPS navigator and a digital camera:

> In the first time when I using it [GPS] I couldn't understand some vocab. It was very difficult to use the camera … Like how to fix the options in the menu. I had most trouble with it because of English language.

Pierre on navigating the menu of MSWord:

> Spacing … I was not used to do it. I didn't know where it [that function] was.

Ahmad on using database and searching articles:

> I said [typed in] "disadvantages of problem-based approach" and then I found nothing. And then I was confused—there are no articles! How can I write my assignment?! … I also tried "difficulties for problem-based approach" and I could not find anything … And then I wrote "challenges of problem-based learning" and I got twenty!

The examples suggest that a number of factors have become barriers for successful navigation and related activities. First, overall language proficiency and the linguistic representations of the Discourses, which are often characterised by specific vocabulary (e.g., academic words, technical words, etc.), appeared to be essential to operate technologies. Second, the students reported that they did not have enough knowledge and practical skills to use some technologies. They found it difficult, at least initially, to develop the technological competence required for some practices. Finally, coming from different sociocultural and educational backgrounds, the participants said they were not familiar with different contexts of Australian life. In addition, they tended to draw on their background but the contexts were quite different—culturally, socially, and technologically. These factors made the participants' practices associated with navigation at least initially unsuccessful—there was a need for knowledge of how to operate different technologies.

Comprehension

Comprehension is the ability to understand the meaning of the content in relation to different contexts. The second category of difficulties refers to the students' comprehension of multimodal texts when reading, viewing, and listening for the purposes of information seeking and engagement in communication. There are two main challenges within this category: non-understanding and misunderstanding for a number of reasons.

Ahmad on reading SMS:

> "LOL" … sometimes I get this word … from friends … I don't understand sometimes the meaning but I know that it's kind of happiness or sadness.

Chen Lin on listening and watching news online:

> So when I listen to it [scientific news] I will feel a little bit confused also because some words in science field are very difficult … It is special vocabulary and it's very difficult to understand … In politic news they use some very formal language structure and it also make me feel confused.

Kate on talking on the phone:

> I could not understand very well when I talk by telephone … Aussie accent is very difficult, very fast and too many rhythms —I could not catch.

Chen Lin on understanding Australian humour and jokes online:

> Some local people just talk about some kiddings, some jokes. Because there is may be their Australia cultural background I don't think it is very funny.

Similar to the previous category, language proficiency within different Discourses and knowledge about the context were reported as important and vital for understanding the content appropriately. The examples also draw attention to the language shaped by technology; acronyms, shortened words, keyboard symbols and emoticons are often used in online and mobile communication, expanding the concept of literacy (Baron, 2008; Goggin, 2006). In addition, different external factors (e.g., intonation, stress, regional accents, background noises, etc.) were reported by the participants as often preventing comprehension in oral communication and other practices associated with listening.

Application of discourses

Informed by the concept of text and its different modes to make meaning (New London Group, 1995), this category refers to the use of language and multimodal elements in a technological environment for a particular purpose or in a special way. The main challenges experienced by the participants were limited self-expression and inappropriate application of the discourse both in written and oral modes.

Chen Lin on choosing between the words "problem" and "question" in writing:

> If they [the words "problem" and "question"] translate into Chinese, it is the same word, which is called "x" [says in Chinese] but in English it's difference … But in Chinese, it is one word. I use electronic dictionary, I just type "x" [says in Chinese] word and then it give me "question," "problem," bla-bla-bla, several things … I want to make a sentence is "I have a question" but may be I can choose "problem" because I don't know the difference between them. And then I make the sentence "I have a problem." Then it is totally different meanings.

Pierre on "qwerty" and "azerty" keyboards:

> Here in Australia it's "qwerty," in France and Europe it's "azerty." When you use it, you have to change because the letters are not in the same place. It takes time. If I type in English keyboard because I used to the French one, I am slower.

Chen Lin on making a PowerPoint presentation:

> When I do my first presentations I use a *lot* of animations but my teacher told me: "It is not good. It is academic one." So my first presentation is get very low marks because I used too many animations. Because in China we can use animation as you like.

For the participants, the use of technology, choice of language, and multimodal elements appeared to be influenced by different factors: overall language proficiency, understanding that practice is embedded in particular settings, and the negotiation of a range of contexts—native, Australian, and global. Relevant knowledge and skills would help the students to express themselves appropriately and effectively in different modes of meaning for a wide range of purposes.

Critical analysis

Critical analysis refers to an analytical approach adapted by the individuals in their use of technology in ESL. The findings suggest that the participants did not always approach technology use critically. Their main challenge was a limited understanding and knowledge of critical literacy practices.

Kate on using grammar-check in MSWord documents:

> Sometimes they [a computer] try to change my grammar to be "semicolon" and I just follow them … I don't know exactly how semicolon used in grammar.

Ahmad about reading and listening to the news:

> It [trusting] depends on the subject. For example, if they are talking about … the war in Iraq … what's going on there I always don't trust them … I think I know what's happening in the Middle East. But when they are talking about Australian culture or something about Australia—yeah … I always trust in this subject.

Kate on her knowledge about the reliability of the articles:

> I just heard from teacher that here we have to choose peer-reviewed … but I don't know much about it. How they can become peer-reviewed?

Ahmad on participating in online debates and discussions on YouTube videos:

> I don't care about the comments … I just ignore.

Three out of four participants found critical literacy practices within the academic Discourse quite challenging because such skills were not a part of their previous learning experience—they were unfamiliar concepts and strategies. The students also reported that they were not confident in their ESL capabilities to engage in critical literacy practices more actively and effectively. Further, they did not feel confident to analyse, evaluate, and critique the information because of insufficient knowledge about context and its norms. Finally, personal characteristics and interests influenced the participants' willingness to engage in critical technoliteracy practices in and out of class.

The affective domain

The affective domain describes how people react emotionally to their experiences (Richard-Amato, 1996, p. 77). Anxiety—as a state of fear, apprehension, and uneasiness—often informed the technoliteracy practices of the participants. They described anxiety associated with "task performance" (Russell & Bradley, 1997, p. 20), "social embarrassment" (p. 20), and a sense of disadvantage in a new sociocultural community. These types of anxiety were closely interrelated.

Kate on talking on the phone:

> I afraid to talk by telephone … if I have to contact something I try to avoid this situation! Everything where I have to contact native speaker I avoid!

Kate on using an ATM:

> If I have to stand in front of machine for a long time I feel shameful. Other people … they might think "Why you have to take long time in front of ATM machine?" … This is quite shameful!

Pierre on applying for a visa online:

> [I was] not happy to answer [the questions in the application] and it was my life privacy but I knew I was forced to answer or I will not be granted for a visa so I was forced. I did it but I saw it was a cultural gap on this between Australia and France.

The findings of the study in relation to anxiety are consistent with previous research (Horwitz & Young, 1991; Matsumura & Hann, 2004; Richard-Amato, 1996)—anxiety may significantly affect, inhibit, and even prevent the development of individuals' technoliteracy. The participants' anxiety associated with

engagement with ICT in English was closely connected with ESL language proficiency, familiarity with the context of ICT use, experience with a wide range of technologies, technological factors, and personal characteristics. Overall, the findings suggest that anxiety is inversely proportional to competence, and this fact emphasises the importance of teaching ESL students technoliteracy.

Discussion: Technoliteracy capabilities

For the participants, engagement with technology in ESL across different domains was vital and important but also contradictory, challenging, and anxiety-provoking. Some experiences were new to the students and differed from the practices in their native languages in many ways. The practices required particular knowledge and skills which the students perhaps lacked, had a limited idea of, or developed in a different way than the Australian context required. The findings suggest that the development of relevant knowledge and skills is necessary to enhance successful technology use in ESL. Drawing on the nature of the difficulties and the 3-D model, technoliteracy capabilities for ICT use in an ESL context were outlined in the study. The capabilities and their relationship with and across the model's dimensions may be represented in the following way:

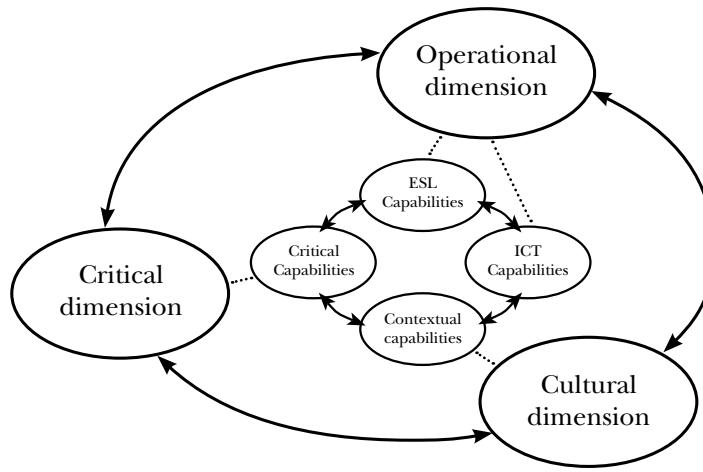

Figure 2. Technoliteracy capabilities in an ESL context from the perspective of the 3-D model.

The capabilities are discussed separately to make the discussion coherent but it is necessary to acknowledge their reciprocal relationship within and across the dimensions.

ESL capabilities in the context of the use of technology include knowledge about and the ability to deal with the different linguistic elements of the target language (e.g., sounds, intonation, words, etc.) and their meanings both in written and oral ways for meaning-making purposes. The students also need assistance to develop and improve their language capabilities within specific Discourses and with spoken language as well as in the new forms of language typical of a technological environment.

The study demonstrated that technological capabilities refer to skills and understandings about ICT. They may be also domain-specific which makes it challenging to list all the essential skills and teach them in the classroom. However, assisting with the development of some basic capabilities can enhance further independent learning and the development of technological confidence and competence.

Contextual capabilities were identified as including knowledge about the target context and its Discourses to achieve appropriate meanings when using language and other modes. Sociocultural aspects are often embedded in ESL teaching, explicitly or implicitly, however, it is impossible to be competent in everything. Hence, learners need to be aware of these connections between meanings and contexts, as well as needing to learn some strategies to overcome these challenges.

Critical capabilities include an awareness that ICT use does carry some risks. The devices and software may fail and the Internet, although a wonderful resource, is also a repository of misinformation. A variety of texts available in a technological environment are informed by someone's values, power, and ideologies. It is necessary to approach technology use sceptically (Lankshear et al., 2000). Critical capabilities also refer to knowing and understanding what concepts, issues, techniques, and strategies critical literacy practices may involve. Finally, critical literacy practices are more beneficial for students when it is a positive, stimulating, and encouraging experience.

The analysis of the data also identified a group of factors (external factors, technological factors, personal characteristics, and interests) which did not deal with the competence needs of students explicitly but which could present an obstacle to using technology in ESL. These factors need to be addressed in the development of certain capabilities and also in developing teaching strategies. The categories of challenges and capabilities, discussed in this paper, are only indicative examples. In diverse contexts of technology use in ESL they may differ.

Conclusion

This paper argues that using technology in ESL is unavoidably central to international students' lives and education in Australia; however it may be challenging, intricate, and confusing. Five interrelated categories of challenges have been identified in the study and illustrated in this article: navigation, comprehension, application of discourses, critical analysis, and the affective domain. Furthermore, the importance of developing and enhancing interrelated technoliteracy capabilities has been also emphasised; in particular, ESL capabilities, ICT capabilities, contextual capabilities, and critical capabilities. Two important points for pedagogy emerge from these findings. First, after many years of using technology, mainly computers, in second language learning as a tool to improve language proficiency, it is time to rethink the role of ICT in ESL education. ESL students need opportunities to learn how to engage in ICT practices in a new linguistic and sociocultural context; they need to have the advanced technoliteracy capabilities that will prepare them to live, work, and study in a society in which technologies are an integral part. Thus, technoliteracy represents a new way to think of technology in the context of second language learning. Second, the 3-D model, which reflects many significant aspects and characteristics of diverse multimodal technoliteracy practices, represents a valuable pedagogical framework. The model draws attention to what "being literate" in the 21st century means, and positions teachers, curriculum writers, and policy-makers as professionals who are responsive to students' needs. This suggests that the 3-D model could be used to inform ICT integration in ESL programs, teaching and learning technoliteracy in the context of ESL education, and designing learning materials.

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