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Bilingualism, Cognitive Flexibility, and Electronic Literacy

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We have moved in the direction of accepting the postmodern values of opacity, playful experimentation, and navigation of surface as privileged ways of knowing.

Life on the Screen, Sherry Turkle:267

Abstract

Electronic text (e-text) is any information displayed via a computer screen including audio, video, graphics, and the written word. As the amount of our reading and writing with electronic texts increases, so too do the number of questions concerning the literacy implications of that activity. English Language Learners (ELLs) represent a rich window through which we can begin to glimpse the ways electronic texts are shaping the language and literacy of the electronic age. Given the special skills, abilities, and diversity of experiences of ELLs, we propose that the unique features of e-text can effectively interact with these qualities in such a way as to help us better understand both the goals, processes, and special characteristics of the bilingual experience and the acquisition of electronic literacy skills. Moreover, interaction of the emerging bilingual's qualities with the unique features of electronic texts provides a novel perspective from which both evolving definitions of electronic literacy and second language and literacy instructional practices can be probed.

Electronic Texts

Electronic texts are comprised of information displayed on a computer screen. They have features and accompanying capabilities that are qualitatively different from what has traditionally served as our primary tool for literacy activity - the print medium (Barker, 1996; Costanzo, 1994; Papert, 1993; Ulmer, 1989; Winkelmann, 1995). The attributes of electronic texts differ from those of print in many significant ways. Print is *permanently static*, where electronic texts are *dynamic, malleable* and *manipulable* (Winkelmann, 1995). Not only can the size, texture, and color of texts be readily changed, but the interlinking of a text's very components can be made explicit through these features as well as via placement and movement on the screen. These features imply that users can employ multiple, flexible strategies for understanding and creating electronic texts. E-texters can shape what they read to suit independent interpretations; e.g., they can readily select, cut, paste, link, and arrange what it is they see and read. Bilinguals could be viewed as coming to dynamic, malleable electronic texts with the kinds of linguistic awareness, life experiences, and flexible conceptual frames that support more efficient interaction than with more rigid, linear print. The flexibility they possess in the face of varying forms of representation may indeed be more well suited to dynamic representation.

Where print is typically *hierarchical*, electronic texts are *anarchic*; their form is instantaneously changeable (Ulmer, 1989). As such, a reader becomes a joint crafter with an author not only in terms of the understanding and shaping of ideas as with the print medium, but in a physical sense with the aid of

software tools. A user of electronic media can physically, visually change the text on the screen either through independently selected or created links to subsidiary information, or through the actual mutilation of what is on the screen. Both the experience of the reader in such an environment and the environment itself are subject to a form of lawlessness. This is in direct contrast to experiences with traditional Western forms of expository print which is most often written within a strict, closed, linear form.

Another consideration is that where print is physically *self-contained*, electronic texts are *hypertextual* and *decentralized* (Winkelmann, 1995). Hypertextual refers to e-texts as linked or linkable to a variety of information in a variety of forms: other texts of all types and genres, images, video. Paths and routes around and between information are determined by the reader who is essentially free to explore and create associated ideas at will. Nor is meaning restricted to a single, closed set of words on a self-contained page. In this sense electronic texts are decentralized. Meanings are potentially broadened and shaped by any number of physically, visually, and imaginatively associated images and documents.

By contrast, one's association and expression of ideas in the print medium are highly dependent on a knowledge of the world and words that is most often culture-bound and privileged. The understandings one builds with e-texts are local and carry the potential of independence from the constraints of a single, sanctioned way of knowing. Rather than following an author's singular, linear train of thought, electronic texts provide jumping off points (hyperlinks) from which readers can link to other information (hypertext) or other parts of an otherwise linear text. The immediate and clean access electronic texts provide streamlines this interactive process of assembly and thereby introduces new possibilities for extended and extendable associations and syntheses.

The widely differing literacy practices, experiences, and text orientations of various cultures have often been cited as a serious source of difficulty for those learning and adapting to a second language, culture, and accompanying literacy practices. In the U.S. in particular, cracking the code of tightly structured hierarchical print forms used in schools and the workplace are particularly problematic for individuals whose life experiences do not necessarily include indoctrination to these forms (Arnowitz & Giroux, 1985; Cummins & Sayers, 1994; Gee, 1990; Heath, 1982; Hill & Parry, 1992). The anarchic and decentralized nature of electronic texts represents unique opportunities by empowering their readers to drive the structure of representations and information in ways that best support the understanding of content; e.g., a learner compiling a multimedia research portfolio. This offers potential for individuals to align their existing experiences with the ordering and independent management of what they read. Freed from the physically locked, culturally-dense domain of print craft, those of differing orientations can tailor their experiences with electronic texts as they wish, thus exercising their flexible stance toward varied forms of representation. Individual volition exerted on the form and meaning of electronic texts may be both a liberating factor and one that ultimately expands their skills and abilities as bilingual/biliterate readers (Meskill, Mossop & Bates, 1999).

E-Texting versus Reading

Computers by nature invite/elicit some response, some relation with the human user (Meskill, 1987). The computer is primarily a tool for communication, for composing, telecommunicating, reading, and understanding others. As such, human-computer interaction can almost always be viewed as a literacy event. Reading, manipulating, responding to, and creating electronic texts in one sense are identical to activities that readers engage in with print. Inherent in both mediums is the act of making connections, the core characteristic of the *homo logens*. Interacting with texts of all kinds is essentially a "psycholinguistic guessing game" to which humans are inherently predisposed (Goodman, 1967) and for which electronic texts are particularly well suited. This is as true of visual (pictorial) texts as it is for the written word in extended discourse to which Goodman ascribes this definition (Arnheim, 1988). Both forms of reasoning -- reasoning with the aural/written word and reasoning with visual information -- engage dynamic cognitive processes; processes that are currently viewed not only as parallel, but as mirrored, interworking systems of understanding.

Interacting with e-text is activity that is qualitatively unique from reading print. The malleability of words - the meaning and appearance of which are more or less subject to the will of the e-texter - renders this an activity that places the e-texter in a position of power: she can pick and choose, change and leave intact, and move in any and all directions through an electronic text. The visual and functional nature of this activity renders it not reading per se, but “e-texting”, computer-based activity whereby one interacts with written and visual information on the screen. E-texting includes working with visuals, audio segments, and written words that differ radically in their form, position, and purpose from the print medium. E-text represents a multi-layered, multifaceted puzzle for which the processes of understanding and solving, while not completely unlike that for print reading, represent expanded and unique opportunities for using and understanding language.

Differences between reading electronic text and what has recently been dubbed “ink reading” imply unique, evolving forms of literacy, or what Ulmer terms “electronic literacy” (1989). A number of attributes for the electronically literate individual have consequently been proposed. According to Ulmer, interacting with or reading electronic text -- what we call here “e-texting” -- requires new ways of reading, thinking, and knowing that diverge from our traditional sense of these activities. Different qualities of mind are needed to efficiently integrate these new forms of symbolic representations into coherent, individually crafted wholes. These qualities include the convergent involvement of both analytic and patterned thinking, the ability to suspend judgment in favor of temporarily riding ambiguities, openness to new stimuli, new ideas, new attitudes, new forms, an increased intuitiveness, and a propensity for tinkering and taking risks. Finally, in e-texting the perceptual precedes and drives the conceptual: in the process of e-texting an individual’s ideas remain in an evolutionary state until a given task requires action/articulation of the conceptual side (see Figure 1).

--insert Figure 1 here--

Bilingualism and Cognitive Flexibility

The tremendous creativity and flexibility that contribute to human language learning cannot be overstated. This flexibility of mind and its propensity for working through and solving the most abstract of syntactic, semantic, and sociocultural problems is by far the most prodigious aspect of being human. All children engage their environments in the quest for developing a system of communication with which they can fully participate. Likewise, when people find themselves in contexts where more than one language is required for participation, they engage the environment *and* their existing abilities and experiences as a speaker of one language to make sense of and develop a second system of communication. Central to this process - the attainment of communication and literacy skills in an additional language - is the fluidity and flexibility learners exercise as they move between their native and target languages and the cognitive processes this movement implies. Moreover, given that literacy is comprised of those forms of thought germane to a specific ‘literate’ group, the emerging biliterate moves between two worlds of representational form and convention; movement that again implies a great deal of flexibility of mind.

Indeed, studies involving metalinguistic tasks and analyses of representational structures have shown that bilingual children tend to solve problems that involve high levels of control and analysis of language better than monolingual children (Bialystok, 1986; 1992). The simplest explanation for this superior performance on tasks requiring metalinguistic and representational understanding is that bilingual children are accustomed to hearing and seeing language in two different ways. As such, they possess not only a heightened awareness of form and meaning, but the concomitant ability to move fluidly between dual realms.

The advantages bilinguals enjoy in terms of cognitive flexibility have been widely documented (Ard, 1989; Bialystok, 1986; Diaz and Klingler, 1992; Peal and Lambert, 1962; Reynolds, 1991; Schinke-Llano, 1989). The requisite skills and strategies for making sense of the world through dual systems of thought, representation, and language are indeed exercised by bilinguals who apparently employ such skills and strategies “more consciously, more purposefully, more appropriately, and more frequently” than

monolinguals (Oxford et al, 1990: 199). This does not however imply “an acceleration of cognitive development, but rather an enriched approach to the use of language as a tool of thought...this leads to cognitive flexibility through self regulation” (Diaz and Klingler, 1991:189). The emerging bilingual enacts a flexible stance to detach from an original context (native) to solve the problems of novel ones (target).¹

An apparently heightened awareness of language and how it operates in the world, a flexible stance toward differing systems of representation, and the bilingual’s facility in moving back and forth between languages and cultures directly parallel what critical theorists have emphasized as characteristics essential to dealing with electronic texts; i.e., that e-texters move fluidly and seamlessly between discourses and their modes of representation (Ulmer, 1989; 1994). Due to their highly visual and auditory nature and emerging conventions that combine modalities of representation in numerous ways, electronic texts require multimodal processing on the part of their readers. It may follow then, that multimodal thinking, or a facility for moving across and between differing representational forms, implies a kind of cognitive flexibility similar to that enjoyed by bilinguals.

A Diverse Medium Serving Diversity

The recent decades have seen a new tension between scientific reasoning (characteristic of and prized by Western tradition) and what Levi-Strauss calls *bricolage*, the non-linear, non-hierarchical, ever-expandable way of knowing the world (Levi-Strauss, 1979). These alternative ways of knowing are more characteristic of “primitive”, non-Western societies than what has traditionally served as the foundations for knowledge in the U.S. Nowhere is this shift away from the static canonicity of traditional Western ways of knowing more manifest than in electronic texts where both democracy and anarchy rule. With e-texts, ideas become tools for constructive/instructive discourse, rather than possessions. On-line resources and the multiple forms and combinations they can take are tools of thought, rather than deliverers of ideas.

Involvement in and the concomitant development of understandings about a piece of print or electronic text are closely allied with the act of invention; a process for which the making of connections is a fundamental component (Ulmer, 1989; 1994). One invents and reinvents a text in partnership with the author or creator of that text. How this author/reader relationship evolves is very much tied to form in conjunction with the experiences and psychologies of its co-creators, the author and reader. In an electronic world, the world we are beginning to experience now and one that our children experience as primary, the notion of reading is expanding to include contact with e-texts in their many and varied forms. Children in the age of electronic text are developing unique skills and strategies for inventing novel forms of understanding these texts that are quite often independent of formal institutional (“school”) literacy training. They are, in other words, developing what Ulmer terms “electronic thinking” (1989). Understanding the nature of this experience and the kinds of thinking it generates is central to any developing notion of what e-texting is and how this activity is changing the ways in which children read and think about the world both academic and experiential.

The current trend in language acquisition studies is to view learning language as a process that involves the analytic and wholistic in combination, with the analytic called into the service of the wholistic. This shift parallels the broader postmodern conception that moves away from the analytic as preeminent. It has evolved as a result of reconceptualizations from diverse disciplines. In terms of language learning, three of the most influential paradigmatic shifts have been: 1) advances in first language acquisition research that clearly demonstrate that from birth, humans are endowed with a highly sophisticated biological apparatus for learning language which gets triggered by direct experience in the world (Chomsky, 1968); 2) humanistic trends in education that recognize and value the crucial role of affect in language and learning (Curran, 1976); and 3) postmodern valuing of cognition that extends well beyond traditional Western ratio-analytic modes of human thought (Ulmer, 1989). The merger of the analytic with the wholistic, with the former subordinated to the latter, is nowhere better exemplified than in e-text. Electronic text is an environment that invites free form creativity, experimentation, bricolage, and discovery; a place where intuitiveness, risk taking, working through ambiguities, and the like, engage. It is an environment that both instantiates and complements the wholistic, with the analytic both driving and ministering to its needs.

Learning an additional language requires the kind of tentative open-mindedness that allows for guessing, the constant reconciliation of dual ways of knowing the world through language in such a way that that system can become internalized as part of one's repertoire of human communication. Suspension of hard and fast judgments is required in the interest of playing intuitive hunches. Learning an additional language exercises a wide range of cognitive and perceptual skills; activity that is not unlike that which is involved with e-texting. Flexibility in the face of potentially ambiguous texts is not unlike what good language learners exercise on a regular basis when confronted with new language forms.

The sum of skilled e-texter attributes points to cognitive flexibility as a critical characteristic of the twenty-first century reader. The fluidity of movement within and between linguistic codes and contexts enjoyed by the bilingual closely resembles that within e-text environments. The accompanying skill to move in and out of varying representational contexts is emerging as a key feature of electronic literacy (Ulmer, 1994).

Implications

Working with electronic texts can profoundly affect not only the experience of literacy but also the ecology of the bilingual/second language classroom. As students engage in dynamic, anarchic, and decentralized interactions with texts, so too does the classroom become a decentralized space in which traditional teacher-fronted instruction becomes difficult, if not impossible. In our research (Meskill, Mossop, and Bates; 1999) we found that language classrooms using computers typically are arranged with machines along the walls and students seated with their backs to the teacher. With the computer screens as the focus of attention, and control over on-screen events in the hands of students, the power dynamics shift in ways that mirror the anarchic and malleable nature of the literacy activities. By controlling keyboards, students assume control over classroom events and as each screen is a window into a different virtual world, they are necessarily engaged in different directions. The resulting dynamics reflect this multiplicity of focus.

The physical environment alters normal teacher-fronted dynamics and as a result students are no longer under traditional constraints. Used as a mediating tool, e-text introduces rich multimodal displays in a manner that is fundamentally unstable and the discourse between and among learners and teachers becomes characterized by immediacy, contingency, and learner-controlled consequences. As such, e-texting in the bilingual/second language classroom can exploit the unique features of e-text and e-texting to the benefit of learners of second language and literacy.

The implications of this empowering environment are, however, double-edged. On the one hand, by breaking free of the constraints of traditional classroom discourse, students use language for a variety of purposes (both real and virtual) that expand enormously their linguistic competencies. In addition to answering questions, they advise, instruct, role play, and ask questions of their own as they read, write, and manipulate what is on the computer screen. This range and richness of language use can only positively impact language and literacy development. On the other hand, however, the speed and contingency of computer stimulated interactions may hinder the development of sustained, focused, inquiry. Direct scaffolding and guidance by instructors and peers is essential to maintain focus and extend focused thinking and talk. Without this guidance, there is the danger of mindless point and click whereby visual gratification becomes a primary goal and overwhelms the cognitive and linguistic significance of representations on the screen. Without thoughtful, careful teacher task orchestration, ongoing guidance, and the scaffolding of literacy work, there is risk that the dynamic, anarchic, and decentralized features of e-text can be rendered superficial. Where instruction with and around e-texts is carefully orchestrated, however, there is great promise that its features can support and enhance the acquisition of language and literacy, both print-based and electronic (Meskill, Mossop, and Bates, 1999).

Conclusion

With electronic texts, an e-texter is not constrained by hierarchical structures; structures that may not mesh with personal, culturally-evolved ways of knowing and understanding the world through the

written word. In terms of the non-native speaker whose literacy orientation and practices may differ from what is implicit in printed hierarchical texts and academic print practices, the power and individual volition they can exert over the form and meaning of electronic texts may be both a liberating factor and one that ultimately expands their skills and abilities as bilingual/biliterate readers. The possibilities presented by non-linearity hold promise in terms of the potential for individuals to align and adapt their existing experiences in tandem with the ordering and independent management of what they read. Freed from the physically locked, culturally-limited domain of print craft, those of differing orientations can tailor their experiences with electronic texts as they wish.

When considering the qualities of electronic literacy, we can learn from the bilingual experience. Skills and qualities characteristic of those who have in effect doubled their perceptual and communicative abilities by virtue of dual languages and cultures can serve as pointers in our quest for understanding the processes of e-texting and their implications for cognition. The very process of acquiring a second language entails honing these valued qualities; e.g., exercising ambiguity tolerance, moving between field dependent and field independent realms, propensity to view reality from more than one angle, naming objects and experiences with two distinct linguistic systems and seeing relationships between the two forms of naming, building empathies through dual experiential modes, and valuing experimentation (hypothesis formation, investigation, testing out, synthesis and internalization). This is the very stuff of learning language, and the key to electronic literacy.

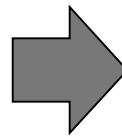
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The Emerging Bilingual

- convergence of analytic and patterned thinking
- suspension of judgment
- lateral thinking
- openness to new stimuli, new ideas, new attitudes
- risk taking
- ambiguity tolerance
- intuitiveness
- perceptual precedes and drives conceptual



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Figure 1: Qualities of the Emerging Bilingual & E-text

¹ It is important to note that due to personal and political factors, there are those in potentially bilingual/biliterate contexts who resist one culture and its language in favor of the other. For further discussion of these factors, see Brisk and Harrington, 2000.