TOWARDS A CRITICAL THEORY OF EDUCATIONAL TECHNOLOGY

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ABSTRACT

The purpose of this study is to offer a critical consideration of current initiatives, and common sense discourses, forcing educators to adopt and integrate educational technology on a large scale. This study argues that it is time –in the relative absence of a critical debate- to ask questions that should precede a wholesale adoption of technology. It will first provide various definitions of technology including determinist and instrumentalist approaches. Then it will move towards a critical theory of technology in which the discussion is broadened to a critique of promises of technology drawing on technopositivism as a marketed ideology. The study cites research –computer-assisted language learning in particular- to show whether the implementation of information technologies has been able to match their promises. It calls for critical awareness of how technology is impacting education and at the same time for the engagement of teachers in exploring the relevant political, economic, and cultural contexts that help shape classroom learning and teaching.

Key words: Educational technology, critical theory, CALL.

INTRODUCTION

There is no question that information technology holds great potential for improving the way that people learn. Through the use of Internet, multimedia etc., learners can engage in individualized instruction where they can investigate and learn concepts and content to meet their specific needs. With a combination of text, sound, graphics, animation, computer technology provides such an environment that traditional teaching media such as books, video, tape recorder, class discussions, role-plays and so forth, might look irrelevant and tedious. Techno-utopians even predict a world in which online learning will replace traditional classrooms and teachers and Internet will foster learner participation and involvement in the learning process. Thus some ill informed educators as well as parents have rushed out to invest large sums of money in equipping classrooms with computers.

In the late 1990s, however, this overenthusiasm was attributed to “technopositivism,” a heavily marketed ideology that perpetuates a naïve faith in the promises
of technology (Robertson, 2003, 282). Indeed, Roberston (2003) claims that teachers are vulnerable to the technopositivist ideology since it adresses our desire and optimism to find quick fix, external and mechanical solutions to complex social and educational problems. Monke (2005) also points out that installing a computer lab in a primary school may provide students with access to information in an unprecedented way but this may come at a cost of less time for art, music or physical exercise. Thus, teachers need to recognize the opportunity costs and that whenever they emphasize one learning experience over another, they make decisions as to what kinds of encounters they value for today’s youth, which in turn has an impact on what they grow up to value (Monke, 2005).

Theories of technology

In the pages that follow, I present two established theories of technology, instrumental and substantive (determinist) theories before introducing a critical theory of technology which, I believe, presents the the most comprehensive theory of technology.

Instrumental Theory

In Instrumental Theory, technology is viewed as a means to an end; technology is neutral which implies four points: 1) Technology is indifferent to the ends it can be used to attain. 2) Technology is not concerned with the politics of societies of capitalist or socialist cultures. 3) The rational nature of technology is the cause of technology’s neutrality and the universal truth it symbolizes. This allows people to believe that because a technology works in one culture, it will work in all cultures 4) Because technology is neutral and it is used as a means to an end, the only rational stance is to employ it to solve any problems, regardless of the cost to the environment, culture, or human beings (Feenberg, 1991).

According to this view, technologies are seen just as "tools", standing ready to serve the purposes of their users. Thus, when technology fails or when it has negative consequences, the cause is not the technology but the improper use of it by “politicians, the military, big business, and others” (Pacey, 1983, 2). A common phrase that illustrates this perception is “Guns don’t kill people. People kill people.” In other words, a tool is subject to its user; it does whatever the user wishes. However, this perception ignores the fact that guns, after all, were designed to kill. Therefore, they are very different from a

pair of binoculars (Talbott, 1997).

As Zhao et al. (2004, 24) argue, this assumption that technologies are passive, obedient tools completely subject to the user leads to misuse, due to a lack of understanding of the forms and functions of each particular technology. Educators might feel both a false sense of empowerment and guilt especially when they see that technology fails them in achieving their intended goals because "it's up to the teachers to make good use of technology." In fact, technology is more than machinery, which maintains the existence and comfort of humankind. It is not a neutral tool; on the contrary, it is loaded with cultural values.

The new technology is not just an assemblage of machines and their accompanying software. It embodies a *form of thinking* that orients a person to approach the world in a particular way. Computers involve ways of thinking that under current educational conditions are primarily *technical.* The more the new technology transforms the classroom into its own image, the more a technical logic replaces critical, political and ethical understanding. The discourse of the classroom will centre on technique, and less on substance. Once again 'how to' will replace 'why' (Apple, 1991, 75).
As Apple notes, a piece of software often conveys a certain teaching approach, which to a certain degree actively shapes what the teacher can do with it. Even the mere presence of a computer in a classroom changes the pedagogical environment.

Another premise of Instrumental theory refers to the notion that all technologies are the same, in other words, they are universal. Such attitudes ignore the fact that tools, by design, have specific qualities, each intended for a specific purpose and each yielding different results (Zhao et al, 2004).

Viewing technology as free of pedagogical or philosophical bias is also problematic. Technologies are built to accomplish certain very specific goals (Bromley, 1998). It means that some technologies might yield good results with some certain tasks but not so good with others. A staircase, for example, is a great technology for people who can walk but it is undoubtedly biased against those who use wheelchairs (Zhao et al, 2004). Another example is the use of visuals in educational software which is widely supported to make the learning an immersive experience where the learner uses all her/his senses. However, research on educational psychology suggest that effective learning with visuo-spatial adjuncts is not dependent on the professional appearance of visuals, but rather on the relation between these displays and the task demands and on the learner's prior knowledge and cognitive abilities (Schnotz, 2002). Therefore, ignoring the inherent bias of technology is likely to result in incompatibility between tasks and tools as well as between pedagogy and technology (Zhao, Pugh, Sheldon, & Byers, 2002).

Substantive Theory

Despite the common sense appeal of instrumental theory, proponents of Substantive theory, best known through the writings of Jacques Ellul and Martin Heidegger, argue that technology constitutes a new type of cultural system that restructures the entire social world as an object of control. They see technology as a force of domination and totalitarianism suggesting that the technology itself automatically brings about certain (good or bad) results (Schmid, 2006).

Ellul (1980) claims that the "technical phenomenon" has become the defining characteristic of all modern societies regardless of political ideology. Heidegger agrees that technology is relentlessly overtaking us turning us raw materials to be mobilized in technical processes. A common example used in the literature is the substitution of "fast food" for the traditional family dinner. It is argued that the unity of the family is challenged by the rise of fast food which might cause the decline of the traditional family.

Morrisett (1996) argues that society can be credited for creating technology, but technology is simultaneously creating society. People have become "compulsive information consumers" who favour the passive reception of information as a form of entertainment over the more challenging act of thinking. Morrisett (1996) adds that institutions of higher education have adapted to these conditions but, as a result, they have also compromised the habits of mind (study, analysis, reflection, contemplation, and deliberation) that are associated with logic.

More recently, Salomon (1998), when he assesses the use of technology in a constructivist-learning environment, draws attention to the negative effects of learning by means of multimedia and hypermedia. He argues that hypermedia and the Internet have a non-linear, association-based structure and the learner, lured by the visual appeal of the presentation, wanders from one item to the other. Salomon and Almog (1998) distinguish this shallow exploratory behaviour from deeper search. The former is influenced by visual appeal while the latter is focused, goal-oriented and metacognitively guided. They assume that learners who are in an intensive interaction with hypermedia products can construct shallow associationist cognitive networks, which have no intellectual merit. This possibility, that is, "the aimless visually-lured wandering through the screens of a hypermedia program" is called The Butterfly Defect.

They further hypothesize that the Butterfly Defect might affect students' conceptions of what knowledge consists of. They may come to believe that knowledge is a hypermedia-like structure. They may also prefer to learn from sources that present fields of knowledge in a hypermedia structure, thus sidestepping the acquisition of the logical, hierarchically structured connections and links that constitute science, as we know it.

Salomon (1998, 7) warns against the danger that technology might redefine the nature of learning environments and the principles of constructivism – the active and thoughtful construction of knowledge- into the active but thoughtless compilation of raw information.

It is as if technology might take charge, demanding of constructivist philosophy and of the psychology of learning and instruction to follow suit and to adjust themselves to the technological affordances.

In a similar vein, Schnotz (2002, 118) speculates that even if the general constraints of the human cognitive system will certainly not change as a result of new technologies, learners could have new attitudes and processing habits.

As humans are exposed to an increasing mass of information that frequently dazzles the eyes, ears and mind, new standards of presenting information emerge. …One can assume that learners who have much experience with electronic media and with new kinds of information presentation might have new expectations, new attitudes, and new processing habits that affect their cognitive processing.

As Feenberg (1991) sees it, the issue is not that machines have "taken over," but that in choosing to use them we make many unwitting cultural choices. Technology is not simply a means but has become an environment and a way of life. That is its "substantive" impact (Feenberg 1991, 8).

Critical Theory of Technology

Feenberg (1991) has criticized both of the theories given above and proposed an alternate view which he calls the critical theory of technology. To him, 'substantive' and 'instrumentalist' conceptions tend to decontextualize technology, divorce it from social practices, and thus fail to provide understanding of how social and historical factors have an impact on its use. He argues that technology is not 'determinist', but is shaped by human agency. He also believes that technology cannot be used towards any ends people wish since technology comes with certain values/biases reflecting its own historical development and design. Therefore, the premise that technology is neutral is false (Schmid, 2006).

Feenberg (1991) sees technology as a contested field where individuals and social groups can struggle to influence and change technological design, uses, and meanings. In fact, one of his key contributions to theorizing technology is linking philosophically-oriented social theory of technology with theories of democratization. He argues that while technology is considered to be a major contributor to contemporary society, it is often believed that it can not exist within democracy. Feenberg, however, wants to demonstrate that in fact technology can be part of a process of societal democratization and technology itself can function as a means to meet basic human needs. To him, technologies should contribute to helping produce a more democratic and egalitarian society.

As Schmid (2006) explains, a critical theory of technology considers that each piece of technology is constructed by the interaction between its design and how it is appropriated by its users. Thus, technology use is seen as the result of the interaction of several elements, such as the inherent characteristics of the technology, teacher's pedagogical beliefs and the kind of pedagogical activities that were designed as a result of them, students' own understandings of the potentials of the technology and the negotiations between students and the teacher regarding how the technology should be pedagogically exploited.

Goldberg and Riemer (2006) describe, from a critical theory perspective, the emergence and growing popularity of online distance education. They argue that online learning has failed to address the additional burdens on faculty members, who struggle with the expanded time commitment required to convert a class to an online format and to attend to students who demand the immediate attention of faculty members to solve their technology-related problems. However, they note that administrators have given little to no consideration to the displacement of teacher in an online environment that has a preference for substituting 'delivery' for 'teaching'.

CALL Studies

When we look at more specifically in the field of CALL, meaningful interpretation of data across various CALL studies remains largely elusive (Dunkel 1991). As Chapelle (1994) notes, "it has become apparent that technical capabilities for data collection in CALL environments far exceed our current theoretical and analytical capabilities for their description and interpretation" (p. 42).

Warschauer (1998) points out that earlier investigations on computers in the language classroom tended to reflect either a 'determinist' or an 'instrumentalist' approach. In the former, the computer is seen as a powerful machine that produces certain determined results on the language learning process. In the latter, however, technology is seen as a tool integrated into the instructional activities of the class. Just like books, technology applications are used when appropriate, for example, using e-mail to improve students' writing skills. Chapelle (2003, 76) refers to this kind of research approach when she points out that priority in the field should be the research that is able to ''isolate the features of the technology that have helped the students and therefore the results can contribute to the professional knowledge about CALL''. Therefore, for Chapelle, the

focus of CALL research should be on the use of technology as a tool for promoting language acquisition processes.

However, Warschauer (1998) draws attention to the fact that, although this instrumental view appropriately takes the emphasis away from the machine per se, it underestimates the effects that new technologies may have on the language learning environment in a broader sense. From this perspective, ‘‘language learning, the teacher and the learner are all seen as unchanged by the introduction of new technologies’’ (Warschauer, 1998, 1).

This study also argues for a critical theory of technology, which stresses the necessity of contextualizing technology and understanding its social embeddeness when investigating its integration in any context. As Bruce (1997, 12) points out ‘‘in order to understand what technology means, we must examine how it is designed, interpreted, employed, constructed, and reconstructed through value-laden daily practices’’. Such an approach would entail examining the circumstances, particular to that setting, in which information technology is implemented, and how teachers and learners interpret it. Apparently, such questions cannot be answered through experimental research methods as the deterministic and instrumental theories have so far endorsed. Rather, interpretive qualtitative research is needed in technology enhanced classrooms. This issue is also raised by Debski (2003), whose examination of CALL research papers has shown that qualitative research is not very widespread in the field. He points out that, although the number of experimental studies has been declining, in overall terms CALL emerges as a field where researchers use mostly quantitative research methods and take a nonparticipant position with respect to the research setting. Motteram (1999) also suggests a shift towards qualitative research in CALL classroom research. He argues that ‘‘the way we might develop a true theory of CALL is looking at qualitative research methods in the first instance and including teachers as researchers into our own endeavours to give us a more grounded theory’’.

Schmid (2006), for example, puts such an orientation into practice and examines the interactive whiteboard (IWB) technology neither as an all-powerful machine (the determinist view), nor as simply a tool for teaching/learning (the instrumental view). Rather, she considers the social and pedagogical issues which have influenced how the technology is adopted, exploited and transformed by the group by which it is used, the changes the use of the technology helped to create and its effects on pedagogical practices and student learning. Data for her study have been collected via a variety of ethnographic research instruments, namely classroom observations and feedback from critical colleagues, teacher’s field notes, video recording of classes, an online discussion forum, classroom discussions, semi-structured interviews with students, and pre- and post-course student questionnaires (p.52).

CONCLUSION

The purpose of this paper, within a critical theory of technology perspective, is to encourage teachers, administrators and parents to take time and ask the questions of “what is the purpose of technology?” and “who benefits from its implementation in the classroom?” Such a perspective would provide us with a more comprehensive analysis of the social and pedagogical issues that would otherwise be gone unnoticed. Only in this way can we have a full picture of the process of technology integration and make judgements about the applicability of the findings to other contexts.

The study attempted to show that there are complex forces behind the drive to reform schools through ICT and it is essential that teacher educators become critical users of technology. As Sula (1999, 1) argues “it is too easy to be lured onto the technology bandwagon, blindly installing networks and computers without thinking deeply about their role in the instructional process.”

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