Addressing First- and Second-Order Barriers to Change: Strategies for Technology Integration

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Although teachers today recognize the importance of integrating technology into their curricula, efforts are often limited by both external (first-order) and internal (second-order) barriers. Traditionally, technology training, for both preservice and inservice teachers, has focused on helping teachers overcome first-order barriers (e.g., acquiring technical skills needed to operate a computer). More recently, training programs have incorporated pedagogical models of technology use as one means of addressing second-order barriers. However, little discussion has occurred that clarifies the relationship between these different types of barriers or that delineates effective strategies for addressing different barriers. If pre- and inservice teachers are to become effective users of technology, they will need practical strategies for dealing with the different types of barriers they will face. In this paper, I discuss the relationship between first- and second-order barriers and then describe specific strategies for circumventing, overcoming, and eliminating the changing barriers teachers face as they work to achieve technology integration.

Despite the fact that computing power has become “more available and affordable than ever before” (Means & Olson, 1997, p. 1), little change has occurred in the way schools conduct their daily business (Cuban, 1993; Office of Technology Assessment (OTA), 1995; Tobin & Dawson, 1992). Even as millions of dollars are being pumped into our schools, ensuring that every classroom will be multimedia-equipped and Internet-connected (U.S. Department of Education, 1998), only 5% of the K–12 teaching force is estimated to effectively integrate technology into everyday practice (Parks & Pisapia, 1994). According to Hativa & Lesgold (1996), “There is substantial survey evidence that, almost three decades after the computer was first introduced in schools, it has not brought about a widespread revolution in methods of teaching or in school structure and organization” (p. 134). Hadley and Sheingold (1993) reported similar findings: “For the most part computers . . . provide either an add-on activity or are simply technological versions of the workbook approaches that are already prevalent in the nation’s classrooms” (p. 265).

Early models of educational change implied that if teachers had access to enough equipment and training, classroom integration would follow (cf., Apple Classrooms of Tomorrow; Fisher, Dwyer, & Yocam, 1996). Although this may have been true for earlier innovations, computer technology is not as readily assimilated into teachers’ existing routines, typically requiring change along multiple dimensions of practice (e.g., personal, organizational, pedagogical). In general, the more integrated one’s technology use becomes, the more fundamental the required changes (Kerr, 1996; Sandholtz, Ringstaff, & Dwyer, 1997). Whereas initial, supplemental uses may require small changes in
classroom management and organizational strategies, more extensive uses tend to challenge traditional classroom culture as well as teachers' beliefs about the teaching-learning process (Ertmer, Addison, Lane, Ross, & Woods, 1999; Means & Olson, 1997; Sarason, 1996).

Although most teachers today are quick to recognize the importance of using technology in their classrooms (Roblyer, 1993), numerous barriers can block implementation efforts. These barriers range from personal fears (What will I do if the technology fails and my lesson can't proceed? How will I gain the confidence I need?) to technical and logistical issues (How does this software package work? Where or when should I use computers?) to organizational and pedagogical concerns (How can I ensure that students obtain adequate computer time without missing other important content? How do I weave computers into current curricular demands?). Although teachers may not face all of these barriers, the literature suggests that any one of these barriers alone can significantly impede meaningful classroom use (Hadley & Sheingold, 1993; Hannafin & Savenye, 1993; Hativa & Lesgold, 1996).

Brickner (1995) extended the concept of first- and second-order change (Cuban, 1993; Fullan & Stiegelbauer, 1991) to categorize these obstacles as first- and second-order barriers to change. First-order changes "adjust" current practice, in an incremental fashion, making it more effective or efficient, while leaving underlying beliefs unchallenged (for example, using the computer, rather than a worksheet, for basic skills review). On the other hand, second-order changes confront fundamental beliefs about current practice, thus leading to new goals, structures, or roles (for example, electronically conversing with an author to explore the cultural and political context of a story rather than writing a book report summary). Barriers to change are "the extrinsic and intrinsic factors that affect a teacher's innovation implementation efforts" (Brickner, p. xvii). Thus, first-order barriers to technology integration are described as being extrinsic to teachers and include beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change. While many first-order barriers may be eliminated by securing additional resources and providing computer-skills training, confronting second-order barriers requires challenging one's belief systems and the institutionalized routines of one's practice. Thus, in terms of technology integration, this may require reformulating basic school culture notions regarding what constitutes content and content coverage, what comprises learning and engaged time, and even, what behaviors define "teaching" (Fullan & Stiegelbauer, 1991).

The purpose of this paper is to describe both the first- (incremental, institutional) and second-order (fundamental, personal) barriers that hinder teachers' technology implementation efforts, to explore the relationship between these barriers, and to delineate effective strategies for addressing each type. Now that computers are approaching critical mass in the schools (Barone, 1996; Morrison, Lowther, & DeMeulle, 1999), teachers and teacher educators are turning their attention away from the adoption decision (to use or not to use computers) to the implementation process (when and how to use computers in meaningful ways). It is important that teachers gain technical skills as well as pedagogical knowledge of effective instructional practices that incorporate meaningful uses of technology. Furthermore, teacher educators and their students must be aware of potential implementation blocks and develop "block-busting" strategies that enable them to eliminate or circumvent the changing barriers they face.

Although this paper focuses, specifically, on teachers' agency in changing classroom practice, this is not meant to discount the systemic and cultural nature of the change process. Rather, teachers are viewed as being key to the change process, coordinating "fit" from within their individual teaching contexts. As noted by Dexter, Anderson, and Becker (1999), "Although culture and context create norms of teaching practice . . . teachers can choose, within these limits, the approach that works for them. This autonomy provides teachers with choices to adopt, adapt, or reject an instructional reform" (p. 224).