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Xiaodong Lin & Charles K. Kinzer

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Xiaodong Lin
Charles K. Kinzer[1]

The Importance of Technology for Making Cultural Values Visible

This article explores the potential for using technological tools to foster teacher understanding of cultural diversity and promote teacher reflection. The authors review several studies in which different technologies were used in ways that allowed implicit teacher and student beliefs to become more explicit and thereby easier to reflect on. These studies were conducted inside and outside of the United States; the uses of technology for reflection are drawn across multiple cultures simultaneously. Three types of technologies are examined in more detail: technological artifacts (such as a software program), multimedia cases, and Information and Communication Technologies (ICTs). The authors conclude by examining the implications of the use of these technologies for teacher reflection and belief change. Those implications are also extended into suggestions for changes in preservice teacher education.

We can no more escape the influences of our culture than can a fish live out of water. This article argues for the importance of understanding cultural values in both oneself and others, and highlights the special need for teachers to understand that cultural values can be made explicit in classrooms to enhance learning. Specifically, the purpose of this article is to (a) explore ways that technologies can help teachers obtain information and reflect on their own and their students' cultural values and beliefs, and (b) explore possibilities for highlighting cultural values in preservice education programs through technology. We begin by providing examples of the relationship between language and culture to show how miscommunication in classrooms and learning difficulties can occur through cultural mismatches. We then link technology to the study of culture and learning. This leads to implications for teachers and others who have an interest in understanding how technology can be used to make explicit cultural assumptions in classrooms so that teachers can create more culturally responsive learning environments.

Xiaodong Lin is an associate professor and Charles K. Kinzer is a professor of education, both at Teachers College, Columbia University.

Cultural Knowledge

Cultural knowledge—the implicit values and behaviors that form accepted practices within a cultural group—is acquired through lived experience and influences all aspects of our lives. While we can understand and empathize with others who have different cultural backgrounds, our own culture is unique to ourselves even while being shared with members from within the cultural group to which one belongs.[2] In this way, shared expectations and communication can occur within cultural

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communities while the unique characteristics of background knowledge become a part of each individual.

Consider, for example, how cultural knowledge influences the understanding of two simple sentences:

Mary had a little lamb. Its fleece was white as snow.

When asked to restate these sentences in their own words, our mainly White, middle-class college students state that this is the beginning of a nursery rhyme, where a little girl and her lamb play together. This explanation is based on knowledge that this is a nursery rhyme common in Western, middle-class culture. The students' interpretations are colored by having had this rhyme read to them as young children (where reading to young children is, of course, also a cultural practice).

Yet there is nothing in the above sentences that leads specifically to a nursery rhyme explanation. Mary could be an adult female having a little lamb for dinner, with the second sentence then being interpreted along the lines of "Its fleece had *once been* white as snow." Similarly, Mary could be the name of a ewe giving birth to a little lamb with white fleece. While each of these interpretations is possible, the nursery rhyme interpretation is only triggered if one has this frame of reference because of having grown up in a specific culture. Not having this frame of reference leads to one or more of the equally logical, alternative explanations.

A related example can be drawn from Steffensen, Joag-Dev, and Anderson's (1979) research, in which adults from India and from the United States read letters about a wedding in each country. Each group was then asked to interpret the letters and comment on what was happening. Interesting differences resulted due to each group's understanding of its own culture and misinterpretation (based on lack of knowledge) of the other group's culture. For example, when reading, "Did you know that Pam was going to wear her grandmother's wedding dress? That gave her something old, and something borrowed, too," the Indian readers commented that the bride was wearing a dress that was old and unfashionable, implying they felt sorry that the bride might have been poor. Those readers were unaware of the cultural tradition of a bride wearing "something old, something new, something borrowed and something blue," which is common in the United States. In similar fashion, the readers from the U.S. misinterpreted information in the letters about the dowry given to the Indian groom's family by the bride's family. The dowry was interpreted as an exchange of gifts (rather than a one-way process) and was related to the gifts given as favors to members of the bridal party by the bride and groom. Similar differences in understanding and interpretation were found between African American and White teenagers who read a passage about "sounding"—an event found in African American communities in which participants exchange insults in a game of one-upsmanship. African American teenagers thought the passage involved a nonthreatening game, while White teenagers viewed the passage as describing a potentially violent confrontation (Reynolds, Taylor, Steffensen, Shirey, & Anderson, 1981).

What the above examples show is that our cultural knowledge provides us with information and experiences that shape our interpretation of events and our expectations of actions and outcomes related to those events. When reading a book set in a given culture (as all books must be), story comprehension will be affected by cultural knowledge. This is especially problematic in teaching situations as classrooms have become increasingly diverse. It is not uncommon for teachers in public schools to have classes that include students from different countries, language groups, and cultures. Consider the difficulties that result, for both the learner and the teacher, if a student from a non-Western culture is confronted with "Mary had a little lamb" and the teacher asks, "What do you think Mary will do with the lamb?" If the teacher, through his or her own cultural background, is expecting an answer influenced by the nursery rhyme interpretation, then answers like "play," will be valued and readily accepted as correct. However, students from a country where lamb is a staple of one's diet might answer, "Put pepper on it." There is a high likelihood that such a response would be questioned and the students required to provide justification for their answer (or, perhaps, it will be simply viewed as incorrect). In this case, the mismatch of cultural knowledge fuels expectations that can result in students being labeled as low achieving or having low comprehension skills, thereby

beginning a downward spiral in terms of the academic potential of particular students. Below, we argue that this downward spiral can be broken by making cultural values explicit through reflection, and that technology can facilitate this reflective process.

Making Culture Explicit for Reflection

The past few decades of research on teaching and learning has revealed an increasing interest in reflection as a means for professional growth and teacher learning, as well as to enhance learning for students (Brown, 1992). The importance of reflective thinking in improving educational practice and community building is well recognized. However, there is less agreement on how to support teacher reflection; the various roles reflection plays in different teaching and learning situations; and the purposes it serves, both academically and as an individual identity and community-building mechanism.

Today, teachers and students have to interact with others whose primary language and cultural backgrounds are much different from their own. We view this interaction as an opportunity to be capitalized on rather than a problem to be eliminated or homogenized. Yet, the kinds of support and knowledge teachers need in order to make this rich cultural knowledge useful is not always available (Gallego & Cole, 2001; Trumbull, Rothstein-Fisch, Greenfield, & Quiroz, 2001). Teachers need tools that facilitate access to specific and detailed knowledge about their own values and assumptions, as well as those of their students (e.g., Trumbull et al., 2001). These specific details can help teachers explain the value systems and cultural experiences underlying the beliefs and behaviors of individuals from different cultures. Understanding why people behave and think as they do helps teachers make sound decisions about classroom instruction and learning (Trumbull et al., 2001).

Cultural values also can have significant influence on teachers' decisions and expectations, and students' efforts, approaches, and attitudes toward learning (Lin, 2001a, 2001b; Matsumoto, 1996; Tweed & Lehman, 2002). Especially important is the need to help both preservice and in-service teachers bring to light the tacit beliefs that affect their actions. As important as cultural knowledge is, it is often tacit and thereby not easily accessible for conscious reflection (e.g., Lin, 2001a; Lin & Schwartz, 2003). Opportunities to help teachers make such knowledge explicit for reflection and discussions can have a profound effect on how teachers teach and assess, particularly in facing students from cultures that are different from their own (Bransford, Brown, & Cocking, 1999). Technology, properly used, enables teachers to realize reflective learning environments in ways that were not previously possible.

Use of Technology for Making Culture Explicit

We argue that technology can be a valuable aid for making cultural values explicit if properly designed and implemented, because it enables teachers to experience something new and nonroutine and therefore allows them to see their own and students' values and problem-solving processes from new perspectives. In addition, technology can be used to develop rich multimedia cases about students that can be analyzed, reflected upon, and discussed among members of the community.[3] These cases help teachers examine their students' learning from multiple perspectives (e.g., views from parents, teachers, school administrators, and knowledgeable others—all from different backgrounds). Such cases can also help teachers notice things about their students that might have been overlooked. Teachers then can develop multifaceted professional knowledge about students and their own practice that can be easily shared with others.

Based on our research and experiences, we think there are at least three ways that technology can provide valuable scaffolds for teacher reflection, particularly about their own and their students' assumptions and values. First, teachers can benefit from experiencing nonroutine practices by using technology artifacts that contradict traditional teaching practices. Second, teachers can learn to understand students from multiple perspectives through the analysis enabled by multimedia-based cases. Third, Information and Communication Technology (ICT) allows teachers to interact with teachers and students from other schools and cultures. Each of these three approches is briefly discussed in the following sections.

Technology artifacts

Artifacts can be viewed as the material, concrete implementation of culture, but their relevance for teaching practice rarely catches the attention of researchers interested in reflection. The seemingly low regard for the material products of culture is surprising because almost all cultural anthropologists include in their definition of culture material artifacts as well as activities associated with the use of those artifacts (Bernard & Pelto, 1987; Cole, 1996; Roth, 2001). In addition, research suggests that values, attitudes, and norms are made visible through their manifestations in artifacts and in their uses. Teachers should be provided with support to use these artifacts in order to explore the values, attitudes, and norms embedded within them. The use of artifacts in this way allows teachers to generate insights about their own and students' invisible values, thoughts, and assumptions (Lin, 2001a; Schofield, 1995).

We believe that technology artifacts designed to facilitate constructivist, or student-centered, ways of learning can serve as powerful catalysts for teachers. Because artifacts carry cultural values and expectations, they can serve as a broker in fostering teacher reflection. Through the use of artifacts, these technologies serve to present teachers with an alternate vision of their own teaching. Experiencing the cultural presuppositions embedded in an artifact can raise questions about one's own cultures, practices, and assumptions, especially if these contrast with the artifact's cultural presuppositions.

In a study involving a teacher from Hong Kong using a technology artifact created in the U.S., the priorities embedded in the artifact's cultural knowledge differed from those of the teacher. Through this contrast we hoped that using the new technology would disrupt routine classroom practice so that tacit aspects of the cultural assumptions and beliefs about learning and teaching would become more visible (Garfinkel, 1963). Using intensive classroom observation and daily interviews with the teacher and students, we documented how this Hong Kong fifth-grade teacher responded to the introduction of this artifact. We did so by comparing the teacher's practice and reflection in routine lessons without the technology artifact to lessons that included the technology artifact.

The technology artifact we used was "The Adventures of Jasper Woodbury" (Cognition and Technology Group at Vanderbilt, 1997). This is a video-based narrative that teaches mathematical concepts in realistic, complex problem-solving contexts rather than through more traditional word problems or direct instruction models. Through this digital, random-access, interactive video series, students were presented with complex, open-ended problems that required the merging of both real-world knowledge and mathematical learning and thinking. Such a learning environment contrasts with the traditional culture of Hong Kong classrooms because it includes the following components: (a) complex problems that require multiple approaches for problem solving; (b) generative learning that requires students to identify, analyze, and solve the problems; (c) collaborative problem solving; and (d) reflection on the learning experiences that would allow changes in plans and actions as the mathematics problems are solved.

We found that using this artifact prompted the teacher to make changes in her teaching by altering the content, sequence of instruction, and social arrangements for class participation. For instance, the analysis of the daily instructional sequence of routine lessons and Jasper lessons showed that the instructional flow remained quite stable and consistent for routine lessons. When the Jasper artifact was introduced, however, the order of the lessons shifted greatly and the instructional sequence became less predictable from day to day.

Our analysis of the teacher's and students' interviews and journals revealed that both engaged not only in an increasing amount of reflection, but also in a different kind of reflection when compared to the routine lessons. For example, during routine practices, the teacher's reflection tended to center around the subject matter and students' routine learning style: "I wish my students were not so quiet and passive. They agree so easily with what I say. I wish they were more active." During Jasper lessons, however, the teacher's reflection had a greater emphasis on students' learning and thinking. She reflected deeply about her identity as a teacher, her assumptions about the functions of the classroom education, and her beliefs about her students' abilities to learn and create new ideas. She

questioned if letting the students pursue their inclinations for how to solve the mathematics problem would erode her authority in class, and she wondered whether letting students work together without her control meant she was no longer a good teacher. In reflecting about her students' learning through the use of this new technological artifact, the teacher found her own assumptions about teaching challenged:

> They came up with ideas that I have never even thought about before. They are all very creative and brave . . . they also dealt with complex information better than I ever imagined. I was especially impressed by their ability to present and explain their problems. They were a lot more independent than I thought. As teachers, we should not control their thoughts too much.

In addition, she explained that student anonymity decreased as she learned more about each student's unique abilities, beliefs, and personalities. Such interactions increased her enjoyment in her experience with them. The teacher also began to establish relationships with the students in new ways. She started having discussions with them as equals, without worrying about losing their respect. Perhaps her most powerful comment was that she now considered that "the students are my mirrors from whom I can get feedback."

This intensive reflection did not occur simply because the teacher had exposure to a new technology. It happened because the use of the artifact caused her to make real decisions about which aspects of her practice might need to change in response, and what those changes would mean for her (and her students') identities as teacher and in-school learners.

Multimedia-based cases as avenues to reflection on culture

In this section, we argue that case-based methods, implemented through multimedia technology, hold much promise both for making cultural knowledge explicit and for learning about other cultures. Case methodology, or the use of multimedia case(s) as the central pedagogical focus in a preservice methods class, provides a vehicle for the study of data while also moving toward cultural understanding. Case methods in preservice literacy education present a rich, virtual classroom environment that includes the actors, agents, and artifacts normally found in classrooms: teachers, children, children's work, instructional materials, instructional methods, parental influences, principal influences, and so on. Through the multimedia case, each of these artifacts and their cultural presuppositions can be studied and used as a source for reflection, as can their interaction.

Consider Figure 1, which shows a sample screen from the CTELL (Case-Based Technologies to Enhance Literacy Learning) Project.

Notice that the user has the option of looking at classroom video, individual students, students' interviews, and so on. The materials that comprise the contents of the case are moderated by an instructional interface that allows choice by the user to move through the various artifacts. The contents of the CTELL cases include information about the individual children in the class as well as information about the child's cultural background. In this way, someone who uses the cases can learn about and consider the instructional ramifications of classroom activities on students from cultures other than his/her own. However, in addition to presenting information from within the case, the technology also allows links, at appropriate teachable moments, to other sites and other artifacts that can also aid in the teacher's acquisition of knowledge about a given culture. In this way, opportunities for understanding and learning about diverse cultures can become a part of teacher education classes in ways not possible before technology enhanced case-based instruction. Those opportunities can then create the space for equity, tolerance, and understanding of difference as a source of potential power, and the examination of students' beliefs.

Technology can be used to foster reflection and examination of one's own culture, in both a general (group) and specific (individual) sense. A technology tool can prompt the teacher for information about his or her culture, compile that information, and compare it to another culture. Extending the Indian/United States wedding example used earlier, technology could prompt the user to make explicit the information that he or she knows about weddings in that person's home culture. Then parallels and contrasts with weddings in other cultures can be provided in powerful ways. These include the

use of artifacts (scans of wedding invitations), video of weddings for analysis, and information on demand about common customs and wedding procedures within respective cultures. Of course, this is only a single example.

Technology allows students access to specific sites at their respective levels. Consider how teachers might help their children learn about Japan through providing activities centering around sites such as Kids' Web Japan (http://www.jinjapan.org/kidsweb).

The site provides links to daily life, folk legends, culture, cookbooks, and so on. Through Kids' Web Japan, children can begin to appreciate the traditions and different viewpoints of peers who are new immigrants, or lay a foundation for interpreting texts and discussions that pertain to Japan and its people. They can learn this information directly from the inhabitants of that country, rather than secondhand through a textbook or encyclopedia. In learning about other cultures, teachers and students both have the opportunity to reflect on their beliefs about their own culture and how those beliefs play out in the classroom, among other spaces.

Communication technology tools

The third category involves the use of technologies to facilitate interactions among people (Cole, 1996; Lee, 1999). For example, global telecommunications technology permits intercultural exchanges that would be quite difficult otherwise. Calls for the use of technology as tools for communication in schools generally focus on the advantages of connecting schools with the outside world. The main stated advantage of this is usually that students can learn from interactions with those whose lives are very different from their own with regard to socioeconomic status, ethnic background, nationality, or region of residence. Most

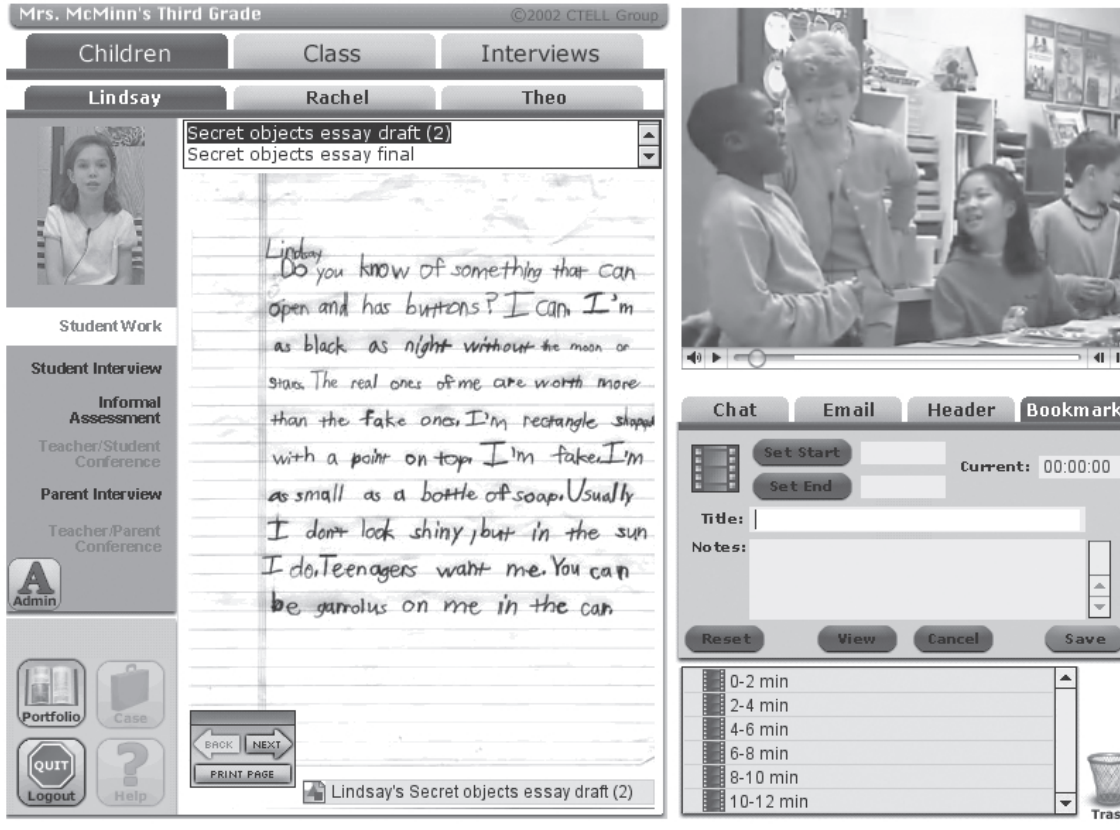

Figure 1. Sample screen from the CTELL Project. Permission to reproduce this screen granted by the CTELL Project Group. Project funded by NSF Grant No. 0089221.

of the technology-mediated intercultural exchanges among students and teachers are designed to meet three key educational reform objectives: (a) better literacy skills, (b) enhanced multicultural awareness, and (c) better job preparation for a global economy through improving the ability to communicate with people from other cultures (Fabos & Young, 1999).

Technology also can be used to promote intercultural contacts as a way to expose students and teachers to fresh models of educational values and practices. People appear to experience a powerful increase in reflection about their own identities, goals, values, and responsibilities—whether across cultures or classrooms—when they engage a new culture using these technologies (Lin & Schwartz, 2003).

However, simply putting students of different cultures in contact does not guarantee that their experiences will be positive and beneficial. Our previously noted Jasper artifact project shows that misunderstandings and misinterpretations can result from cultural differences and, if left unresolved, may negatively impact students' opinions of people from other cultures (Lin & Schwartz, 2003; Schwartz, Lin, & Holmes, in press). To overcome or prevent these misunderstandings, it is important to create activities that enhance reflection as well as learning by the teachers and students. To do so, a follow-up project required students from the U.S. and China to exchange and assess one another's social studies homework by using e-mail. We investigated the effects of intercultural peer feedback on U.S. students' willingness to revise their social studies homework.

At the initial stage of the homework exchange, U.S. students felt the Chinese students were much too harsh in their feedback. But the Chinese students' comments were based on a culture where teachers feel they need to be as critical as possible so students can improve—otherwise they would not learn effectively. Given this conflict, how can we help teachers and students be receptive to one another's insights and different academic values? We explored the value of sending the Chinese students not only the U.S. students' work but also self-assessments about their work. Our thought was that including the U.S. students' self-assessments would cause the Chinese students to comment not only on the students' work, but also on the students who produced the work, in the hope that this would generate feedback that was more positive and specific.

The U.S. students' self-assessments presented information about why they did what they did and how well they felt they had achieved a set of criteria including "creating stories that had main ideas," "were interesting," and "were accurate with respect to Chinese history." The American students also reflected upon the struggles they went through to do their homework. Half of the Chinese students read the work plus self-assessments and the other half read only the work. The Chinese students worked in groups to provide written feedback to the U.S. students. The differences between the feedback generated by the two groups of Chinese students were striking. Chinese students who did not receive the U.S. students' self-assessments were uniformly critical and less friendly. The students who received the self-assessments were much more positive and encouraging.

The submissions that included self-assessments also elicited more specific feedback about dimensions of the work that needed improvement, and produced feedback that was friendlier in tone. These differences in tone had an effect on the U.S. students. Interviews showed that U.S. students who received the friendlier feedback felt a stronger bond with the Chinese students and indicated more willingness to continue working with them. Most importantly, the U.S. self-assessors were more open to the Chinese students' evaluations of their products and tended to view their requests for revisions positively, rather than as signs that they had failed. We found that seeing signs of reflection and self-assessment in others makes members of both cultures more receptive to thinking about each other's beliefs, practices, and artifacts.

Another interesting aspect of this study is that learning with peers from another culture helped the U.S. students notice important learner characteristics exemplified by the Chinese students that they then used in reflecting on their own learning. For instance, the U.S. students noticed that the Chinese students wrote clearly, logically, and explained themselves well. They also noticed that the Chinese students were generally more serious

about schoolwork than they were. However, they found that the Chinese students' English grammar was not as strong as their own, which opened up a potential area where U.S. students could offer help. At the same time, the interactions helped Chinese students get to know U.S. students as individuals who experienced a variety of struggles and difficulties in producing the homework product.

The U.S. teachers also learned something important through their involvement in and reflection on the project: they realized they had lower expectations for their students than did the teachers from China. The above findings are consistent with other research in cross-cultural psychology implying that another culture provides a contrasting case that can help people notice what was previously imperceptible (Lin & Hatano, 2003). In brief, technology is a powerful communication tool that mediates productive intercultural contacts and can play an important role in shaping and understanding one's own values and practices.

Conclusion

In this article, we have attempted to show how technology can help teachers and students reflect on their own and others' cultural assumptions. We did so by noting that our cultural knowledge, which is often implicit, influences how we interpret and understand the world around us. For this reason, we feel it is important that teachers become aware of their own cultural assumptions and the cultural differences of the students in their classes. We think that teachers' ability to understand and acknowledge cultural differences and their effects on teaching and learning becomes more important as classrooms become more diverse.

We also argued that students' and teachers' cultural knowledge is often invisible to them, thus tools that can help teachers and students make these values explicit become crucial. Part of this process should be embedded into teacher education programs which, in addition to teaching general education strategies, should incorporate units that facilitate learning about one's own cultural knowledge, about differences between several cultures commonly found in the nation's classrooms, about effects that cultural knowledge has on teaching and learning, and about strategies and tools that preservice teachers can use to continue their learning about cultures after they graduate from their preservice programs.

In this article, we chose to focus mainly on reflection about oneself in relation to students in one's class. Such reflection is a deeply social act in that it considers one's behavior in terms of how it affects others. This implies that teachers must have something specific on which to reflect. Technology can present artifacts in ways that support reflection, and technology can also be used by teachers and students in a "just in time" learning sense to examine other cultures in relation to their own. This can be accomplished through case analysis, stand-alone web sites that target a single culture or cultural group, and Internet-based projects where students of different cultures can work together in meaningful projects that allow different people to learn from each other.

In summary, we think that technology is valuable in supporting reflection by teachers because (a) it allows teachers to experience something new and nonroutine in ways that allow them to see their own and their students' values from new perspectives; (b) it can be used to develop cases of classrooms and individuals that are comprehensive and allow study of multiple perspectives; and (c) it can enhance communication and contact between students and teachers from different cultures in ways that support reflection on one's own beliefs and how these beliefs influence teaching and learning.

Notes

1. We acknowledge, with thanks, feedback and assistance from Dana W. Cammack, Teachers College, Columbia University, in addition to the helpful suggestions from our reviewers and editors. Author order was determined randomly to reflect equal participation.
2. While all individuals operate from within multiple cultural perspectives that depend to a large degree on the context in which they find themselves (e.g., the culture of school, home, age-based peer group, and so on), in this article we address culture in its most generic sense.
3. Multimedia cases are enhanced through the use of technology and offer major benefits when compared to print-based or videotaped cases. For a discussion of these differences and their benefits, see Kinzer and Risko (1998).

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