# Communities of Designers: Transforming a Situation into a Unified Whole

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A new player, digital technology, has entered into the already variegated and often contentious world of teaching and teacher education. This new player promises to disrupt existing practices in some as yet undefined way. It is not surprising that its eventual impact on learning or on educational equity is uncertain, when there is still great uncertainty around basic questions such as which digital tools ought to be considered or what they cost.

The previous chapters in this book make a major contribution to the conversation about (digital) technology in education. They address three large questions: How should we integrate technology into learning? What happens when we do? How do we learn to do it (possibly better than before)?

As Mishra, Koehler, & Zhao (Ch. 1) say, the book "documents the stories, in their own voices, of a group of faculty members and graduate students … as they struggled to learn about, and implement, technology in their own teaching." One might expect that having the participants tell their own stories entails a certain amount of self-promotion, and every story relates accomplishments. Yet these tales also include details of the context, the participants' perspectives and the difficulties encountered in a rich way one rarely sees in books about technology use.

As a sort of distant relative who dropped in from time to time, I had the privilege of seeing these experiences more closely than most people other than the direct participants. At the same time, I had a distance that afforded a perspective distinct from that of those doing all the hard work. In the present chapter, I share my capsule interpretation of what occurred in this large, multi-year project, with the aim of addressing questions such as the three posed above.

I draw on Dewey's theory of *situation* (Dewey, 1896/1972, 1938/1991, 1939/1991) as a lens for examining this multifaceted communities of designers project. Dewey's theory is consistent with the underlying philosophy for the project, and as such provides a means for identifying its most significant contributions, as well as its limitations. It also helps us to see possible future directions.

## Dewey's Definition of Situation

The work of John Dewey and other pragmatists, such as Jane Addams, Charles Sanders Peirce, and William James, undergoes periodic rejections and resurgences. Dewey in particular, appears to be in resurgence now, drawing attention from diverse quarters of social and political theory, education, feminism, aesthetics, logic, and ethics. In education, his works are once again widely and unapologetically cited, especially in reference to inquiry-based learning.

In general, these citations are justified and appropriate, but their wide acceptance actually precludes a close examination of some of the more interesting implications of Dewey's theories. Some writers (Burke, 1994; Dwight & Garrison, 2003; Hickman, 1990; Koschmann, 2001) have explored these implications in more depth (and certainly in more depth than I can here), but in general many readings of Dewey miss some points that are generative, and perhaps controversial. One reason that much educational discourse glides over these points is that Dewey takes ordinary words and stretches their meaning or asks us to think about implications we normally overlook.

An example is the word, "situation." In common use, attention to situation means thinking about context, being grounded in real phenomena, or recognizing sociocultural aspects of learning and understanding. These elements are all there for Dewey as well, but his use of the term goes significantly beyond that. For Dewey, situation is not something we enter into, nor does it really exist independent of inquiry. Thus, we cannot speak of a student investigating, say a concept in history within a situation comprising a textbook, an essay assignment, group work, and primary source materials. A situation instead is an interconnected functional relation involving the inquirer and the environment. It is a dialectical situation of which we are a part, not a spectator. We change that situation and are changed through our actions. In his classic reflex arc paper Dewey (1896/1972) shows that under this view, conventional distinctions between organism and environment, stimulus and response, body and mind, or cause and effect need to be reconsidered. In his 1941 paper, "The human skin: Philosophy's last line of defense." Bentley goes further to show that even the distinction between "knower" and the "known" relies on an incomplete understanding of situation, positing the knower as separate from the environment.

While eliding some conventional distinctions, Dewey introduces new ones, such as that between indeterminate and determinate situations. His definition of inquiry uses this distinction to provide a descriptive account of how we survive in the world:

> Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole (Dewey, 1938/1991, p. 108).

It is important to note that this account is descriptive, not prescriptive. That is, Dewey does not argue that we should transform indeterminate situations, or that a good way to help people learn is to have them do that. Instead, the controlled or directed transformation of indeterminate situations is what we do as purposive organisms. In that sense, inquiry-based learning is not a method or an option to consider for teaching and learning; instead, it is what happens when people do learn.

The resolution of a problematic situation may involve transforming the inquirer, the environment, and often both. This means that inquiry is a concrete, embodied process. Viewed this way, action in the world is not a follow-on to thinking, nor simply a means to foster cognitive development (e.g., hands-on learning to get a concept across), but along with thinking it is an integral part of inquiry. Following out the implications of this perspective, one can see that the usual splits between theory and practice, or between work and education, make little sense.

The emphasis in Dewey's definition of inquiry and his use of situation is on trans-formation, on remaking the world along with ourselves. Because situations include others, inquiry involves at its core collaborative practices in real communities. The usual categories (teacher/student, technology/concept, knowledge/skill) are replaced with a need to understand the process of trans-formation: What means are employed to transform an indeterminate situation? What are the varied roles played by tools, ideas, and people in inquiry? How does an inquirer evaluate the unity of a situation? How do multiple inquirers coordinate their activities? How do people frame the discourse around technology in education?

## How Do Faculty Learn About Educational Technology?

Situation, as used by Dewey, provides us with a perspective on teaching and teacher education, and its dialectic with technology. We can begin to see this as we look at conventional approaches to faculty development around technology in contrast with the communities of designers approach.

### The Conventional Approach to Faculty Development

The conventional approach to faculty development around new technologies is expressed well on the "Preparing Tomorrow's Teachers To Use Technology (PT3)" Web site (Advanced Learning Technologies - Center for Research on Learning, 2002):

> PT3 grantees have worked to transform teacher education so that technology is integrated throughout teaching and learning. Their goal has been to ensure that new teachers enter the classroom prepared to effectively use the computers that await them.

This apparently non-controversial and all-positive conception builds upon several assumptions, which pervade the Websites, brochures, training workshops, and services of most university offices of instructional technology:

- The primary goal is to encourage faculty to use more technology in their classrooms;
- The use of technology will lead to a change in instructional practice that will bring about increases in student learning and motivation;
- Technology is a relatively autonomous means for improving instruction across disciplines and settings;
- The focus is on developing facility (fluency) with the tools;
- Learning to teach with technology may be difficult, requiring training, workshops, and support;
- Resistance to technology use represents simply a misunderstanding of its potential;
- Difficulties in adoption are simply challenges for technology advocates and faculty to overcome together.

This is a linear model in which technology is assumed to be a good that should be incorporated more fully into teaching, that technology skills are on the critical path to success, and that resistance to technology needs to be overcome. Despite the widespread acceptance of these assumptions, none of them are supported by the research literature on the subject Much of that literature is divided between inspiring stories of educational transformation and accounts of failed technologies, limited support, faculty resistance, bureaucratic inertia, and divergent interpretations of outcomes. For the case of inspiring stories, it is debatable whether the faculty involved changed instructional practices because of the technologies or that their path of development looked anything like that implied in typical institutionalized faculty development models. The accounts of challenged implementations suggest further that the linear model of transformation does not work. In Dewey's terms, these assumptions fail to see the situation of the faculty learner, instead focusing on isolated elements. Other studies (e.g.,, Becker & Ravitz, 2001; Bruce, 2003; Ferneding, 2003; Haertel & Means, 2000; Hawisher & Sel;fe, 1999) show that the process of change takes on a different shape depending on a variety of factors including the pedagogical history, administrative and technical support, and teachers' assumptions about the role of technology in learning.

## The “Communities of Designers” Approach

The "communities of designers" model addresses technology integration in teaching and learning in a different way. It argues that good teaching requires a "thoughtful interweaving of all three key sources of knowledge — technology, pedagogy and content" (Ch.1, p. XXX). This interweaving paradoxically shifts the focus away from technology by demanding a deeper commitment to understanding its possibilities, characteristics, and limitations. Rather than working "to transform teacher education so that technology is integrated throughout teaching and learning" it sets up collaborative inquiry into the relations

among technology, pedagogy and content. This entails a rejection of the assumption that faculty should use more technology in their classrooms, instead calling first for a critical assessment of the goals, values, and contexts for learning. Whether that critical assessment leads to the use of a particular tool, and how that tool might be employed are questions viewed as aspects of the inquiry, not a priori objectives.

In contrast to the assumptions listed above, the "communities of designers" model builds upon a set of principles (Ch. 1, pp. XXX), which reflect a greater attention to situation as historical, constructed, and embodied. Consequently technology is conceived, not as an unalloyed good to be added unproblematically to a given situation, but as an element of that situation, one that is subject to interpretation and transformation.

The first principle is that a teacher's ability to use technology must be closely connected to the ability to teach. "Understanding of technology must be grounded in … understanding of teaching and learning in subject-specific and learner-specific contexts." This principle implies that technology use alone will not lead to "a change in instructional practice that will bring about increases in student learning and motivation." Moreover, resistance may not be a mis-understanding of the potential of technology, but instead a critical judgment of its relation to pedagogical goals and characteristics of the content.

A second principle is that technology "is a medium for expression, communication, inquiry and construction that can help teachers solve pedagogical problems in classrooms." This means that far from being a desirable end in itself, technology is but one element within the problem-solving environment, what Dewey terms an "indeterminate situation" (Dewey, 1938/1991, p. 108).

A third principle is that "the implementation of technology is the reinvention of technology. The realization of technological potential in educational settings is socially constructed and highly situational." Because the resolution of a problematic situation may involve transforming the inquirer, the environment, or both, technology must also be seen as an element subject to transformation.

A final principle is that "the relationship between technological innovation and established educational practices is dialogical." This principle contradicts the prevalent deficit view implicit in many faculty development models, i.e., that the faculty lack knowledge and skills, have corresponding fears and resistance, and need coaxing and training to be transformed.

### How Can We Interpret the Communities of Design Experiences?

Reading through the chapters in this book, as well as thinking about other communities of design work reported only tangentially here, I am struck by the diversity of topics, approaches, settings, and pedagogies. Cheryl Rosaen and Sharon Hobson (Ch. 4) talk about a large variety of ways that technology, guided by considerations of learning, can infuse both teaching and teacher education.

Laura Apol and Sheryl Rop (Ch. 5) seek ways to use video to make literary response come alive for future literacy teachers. Leslie David Burns and Stephen Koziol (Ch. 6) seek ways to help students use their own video in an English methods course. Dorothea Anagnostopoulos, Jory Brass, and Dipendra Subedi (Ch. 7) work with high-school students to explore video production and in the process examine their own conceptions of literacy. Avner Segall and Bettie Landauer-Menchik (Ch. 8) work with teachers to design ways to foster critical reading of maps. Timothy Little (Ch. 9) explores collaborative development of social studies materials. John Dirkx (Ch. 10) studies how to use technology to address existing limitations with Problem-Based Learning in face-to-face environments. Ann Austin (Ch. 11) talks freely about challenges for both her students and herself in incorporating technology into the Higher, Adult, and Lifelong Education Program.

What can we learn from the communities of design approach and the experiences of those involved? How does it achieve the things it does? How can it be improved? These questions can be examined from the perspective of situation as discussed above, and specifically, by employing Dewey's definition of inquiry. Implicit in that rather compact and somewhat obscure definition (one of the few that Dewey provides explicitly, by the way), are a number of powerful ideas. One is that inquiry is not simply a process of accumulation of knowledge, but rather, a process, that is, a story involving recognition of a problem, physical and mental actions to address it, and a repeated cycle of evaluating and further transforming a situation. A second key notion is that of indeterminacy, along with its opposite, a unified whole. What's important here is the way that evaluation is integral to inquiry, that is, a continual assessment of the situation by the inquirer. (In Dewey's model, self-evaluation is the paradigm case, not a fringe approach). A third concept, community is not obvious in the definition, but when that definition is taken within the larger framework of pragmatism, it is clear that situations encompass social life, and the process of transformation typically involves collective action, including that of changing the community per se. A fourth idea, design is also not explicitly in the definition. But in the sense of design used in this book, one might do well to substitute it for inquiry, which in some circles has been reduced to a cognitive activity. Design encompasses both an enlarged understanding of situation as well as action to transform it. In that sense it accords well with Dewey's definition of inquiry. A final concept relates to the contradiction inherent in community-based design: How can individuals with unique experiences, attitudes, perspectives, values, and goals work together to design in a way that builds on their unique situations, if different situations require different designs? This is not easily resolvable, but it can be negotiated through boundary objects, which allow readings different enough to accommodate different situations, yet are similar enough to allow collective action. In what follows, I apply the notions of Story, Indeterminacy, Communities of Action, Learning by Design, and Boundary Objects to the experiences reported in this book.

Story

Despite the diversity of these accounts, there are a number of common elements. Each tells a story, and not only because that was an agreed-upon genre. There is also a story to be told, one of initial expectations, approach, problems encountered, problems overcome or accepted, and plans for a new day. Any account that simply assessed the status at a given point would miss the important transformations of the situation. In Dewey's terms, each chapter describes an indeterminate situation and the directed transformation of that towards a more unified whole. The transformation in nearly every case involves not only "interweaving," but changes in all three of the key sources of knowledge identified in the model: technology, pedagogy and content. Moreover, there is always some degree of transformation of the participants as well.

For example, Segall and Landauer-Menchik talk about their initial goal to help students move beyond the interpretation of maps as natural, to see instead the rhetoric of maps. As they work with new technologies, social studies materials, teachers, and the divergent contexts of university and school, they are forced to confront a variety of technical, institutional, and social issues. One consequence is to understand more deeply the situation of the schoolteachers in terms of preparation time, testing, and mandated curricula. Another was to shift technologies, from web-based to CD-ROM. The process of this transformation of the indeterminate situation is a key aspect to understanding both their own learning and the resultant nexus of technology/content/pedagogy.

Indeterminacy

In contrast to much of the rhetoric about technology in education, the authors here are quite frank about the challenges they encountered, even in the context of a generally positive disposition towards the new technologies. Words such as "frustration," "problem," "challenge," "difficulty," or "disappointment" occur often throughout. In some cases these are disappointments of the faculty involved; in others they are of K-12 students, cooperating teachers, teacher candidates, technology facilitators, or support staff. Most often they relate to the intersection of pedagogy, content, and technology, and how the technology does not meet expectations. For example, Timothy Little (Ch. 9) relates how new versions of PowerPoint software were installed on the classroom computers, which do not recognize earlier versions of curricular materials. He also talks about how graphics /branching heavy programs rendered floppy disks inadequate. They moved then to zip disks and later, CD-ROMs. As he says, "the need to repeatedly transfer and retransfer data coupled with the need to reformat after the programs are transferred can diminish the intellectual ardor of even the most devoted technophile."

Throughout the communities of design project, much time was spent on the technology in the sense of simply getting it to perform promised functions. This raises a question, which can be expressed in terms of the inquiry definition: What is the indeterminate situation here? Ideally within teacher education, that

might be to focus on creating a unified whole of pedagogy/content/technology, but in many cases a large proportion of the effort appears to be to find a way that computer user and computer can live in harmony. Thus, technology may have been an equal partner in principle, but it often demanded more than its equal share.

Communities of Action

When automobiles were first introduced, they were of little use to most people. Although the machine itself did not carry much nor go very fast, that was not the problem. The greater difficulty was that roads were unpaved, service stations non-existent, laws inadequate, auto components unreliable and difficult to find, and alternatives were too convenient. Only later, when the ecology for automobiles developed did we see them coming into widespread use. Later, as suburbs developed, downtowns died, workplaces became more far-flung, and passenger railroads disappeared, the car went from novelty, to possibility, to necessity.

One of the challenges for technology integration is that we do not have a supportive ecology, so the effectiveness of a particular technology is almost moot. In this project, that ecology was more present than is often the case. As a result, every chapter shows ways that affordances of the technologies were realized as improvements to practice. Participants were able to overcome the challenges encountered–to transform their situation into a unified whole–because that situation included a supportive ecology. Every chapter refers to the multiple levels of collaboration involved. Ann Austin (Ch. 11) articulates this quite well as she discusses communities and collaborations for the Proseminar project through the College of Education, the Higher, Adult, and Lifelong Education Program, the Professional Development Course, the specific design team organized within the context of the Professional Development Course, and the Proseminar itself. Others discuss the importance, and the challenges, of collaborations with communities of university students, K-12 students, and cooperating teachers.

Invoking Dewey's definition of inquiry again, it is not surprising to see the importance of these multiple teams, groups, and communities to the design process. Other people, particularly those who are collaborators or clients, are integral parts of the design situation, whether that situation is indeterminate or determinate. But the definition also highlights something that is usually absent or at best implicit in the stories: Communities are not simply static surrounds for design or inquiry. We do not merely situate the triad of pedagogy/content/technology within a community, or rely on a group to support us in the design. To the contrary, communities are themselves part of the situation which is being transformed.

In the chapters, accounts of the consequence as new members are added to or leave a team are frequent. Others talk about the negotiations between university faculty and cooperating teachers (Segall & Landauer-Menchik),

between high school students and researchers or among team members (Anagnostopoulos, Brass, & Subedi), and between educators and technologies (all). But these accounts tend to be positioned as happenstances that affect the design process, which itself is focused on pedagogy/content/technology. The idea that participants are actively transforming the social aspects of their situations is not conceived as a design problem, but as part of the context for design. This positioning is in part due to the focus on communities as historically-constituted, geographically-based, and in a sense larger than the task at hand.

However, the pragmatist view of inquiry leads us to see communities themselves as actively constructed (as they are in fact in the communities of design project). A useful construct here is what Zacklad (2003, p. 193) calls community of action. Zacklad argues for this term (over community of practice) for "dealing with small groups which actively and thus to some extent rationally pursue explicit goals while relying on a tightly woven fabric of relationships to promote mutual sympathy and the mimetic learning that is assumed to characterize primary groups and communities of practice." Communities of action work towards two kinds of goals simultaneously. The first are service goals, which involve transforming an external situation, e.g., designing a new use of technology for learning. The second are integration goals, which involve constructing an internal social milieu allowing its members to develop mutual knowledge and identities. These two categories of goals reflect the fact that community is a necessary means for transformation of the situation, but as a part of that situation, it, too, is transformed.

## Learning by Design

Issues of design pervade this book. We see individual faculty designing new ways to incorporate technology into teaching and learning. Within each project, issues of design recur whether it be for PowerPoint presentations, English lessons, maps, or problem-based learning. In the process of design, faculty conceive of pedagogy, content, and technology as designable entities. Several of the projects extend the process of design to include university students, cooperating teachers and their students as designers in a collaborative process.

The result of this attention to design is that individual teams have developed excellent activities, programs, and curriculum modules. Another paper could profitably be devoted to discussing the details of those creations. In addition, there is strong evidence now that faculty learning is deeper, more critical, more connected to use, more lasting, and more engaged. This book and the various research projects faculty has undertaken testify to its substantial impact. Moreover, the inquiry model that underlies learning by design supports that, because learning by design is active, embodied, and situated. It matches closely to the full sense of inquiry as defined.

One way to describe the difference between learning by design and more conventional approaches is in terms of binding time (Wegner, 1968). This

concept, out of programming language theory, refers to the time that terms (such as variables and function designators), in a computer program are assigned values. Somewhat surprisingly, it is useful for thinking about issues of technology use in education (Bruce, 2004). For example, a learning by design approach postpones the binding of technology choice and use from the perspective of the faculty in a faculty development program. Rather than settling on a particular technology, or a fixed way of using it, as some programs do, learning by design engages the faculty in making those decisions. That contributes to their learning being deeper, more critical, more connected to use, more lasting, and more engaged. The faculty members are active creators of meaning, not passive recipients of the inquiry of others.

Binding time also helps us see an important potential problem. To the extent that faculty do become deeply engaged in learning and committed to their designs, they may create early, and even rigid, binding from the perspective of their students. Do those students have the same opportunity to experience the learning that comes through taking responsibility for one's own decisions, encountering and overcoming challenges, negotiating among competing demands of pedagogy, content, technology, and community, or do they become passive recipients of technologies designed and created by someone else? How easily can faculty let go of approaches they spend years designing? Moreover, if their students become teachers themselves, do their students in turn have the opportunity to design, and learn by design?

Analogous second- and third-order issues such as this are endemic to teaching and teacher education, but the use of new technologies highlights the challenge. It brings us back to the communities of action issue: How can our situated design work come to include reflective design of the communities that need to engage in further design?

## Boundary Objects

Boundary objects allow computer programs to communicate, to work with the same data, even if they interpret it differently. For example, a set of data may be interpreted as a list of events by one program, which calculates the actilvity level of a group and as pointers to publications by another program, which complies a bibliography. For the programmer, the challenge is to design the data in such a way that it can serve multiple purposes, thereby facilitating communication among the programs.

Star and Griesemer (1989) extend this term to human activities. Boundary objects allow readings different enough to accommodate different situations, yet are similar enough to allow collective action to transform those situations into more unified wholes. In Berkeley’s Museum of Vertebrate Zoology bioiogists, administrators, and amateurs were collecting specimens of flora and fauna to record what existed in California in the early 20th century. Although they shared the goal to "preserve California’s nature," they had different means and motives for achieving this. Standardized forms were devised to facilitate communication

across dispersed work groups thus acting as boundary objects for the different participants. State maps and other artifacts also served this role as did the museum itself.

In the current project, participants likewise came from many different disciplines (Social studies education, English education, elementary education, educational technology), and different institutional roles (university faculty, programmer, graduate student, teacher candidate, etc.). They needed to find ways to work together on a common project while maintaining the value of their diverse backgrounds, knowledge, skills, and personal connections. To reach complete agreement on every concept would have paralyzed the project. On the other hand, not to have common bases would have precluded collaboration.

The solution was boundary objects, though they may not have been conceived in that way. For example, faculty development course is one; it has different meanings for each participant, yet it indexes a common set of experiences. One participant may conceive the course as a way to get needed technical advice, while another conceives it as a way to improve their own teaching. People may come for a variety of professional, social, or institutional reasons. Even during the course, specific activities, such as sharing a discovery about use of a technology may happily allow divergent interpretations while furthering the sense of a common goal, common challenges, and common experiences. This dual function of key objects may be essential for successful collaboration,

We can go one step further to see the entire communities of design project as itself a boundary object. It is true that it has a programmatic agenda, objects, people, and physical spaces. But it is also a resource by its very existence. As such, it is a site for community building, a means of political action, a medium for connecting university and school, and an impetus to software design. Rather than viewing the project as a collection of design teams, a funded grant, or a reform program, one can see it as a situation in Dewey's sense, one that participants seek to take through a series of transformations to a more unified whole.

## Conclusion

Dewey's concept of inquiry, embedded within his theory of situation, provides a standpoint for examining the communities of design project. It also provides questions for the future. For example, Dewey argues that every voice needs to be heard in a democracy, not only to be fair, but because we all need to learn from the unique experiences that each of us has. In this book, we see those unique experiences through accounts of the conflicts between school and university, school and after-school, or university course learning and the role of teacher in K-12. These conflicts are not easily resolved, yet may be the source of the greatest insights for design. How can communities of design be extended to include more of the participants in the larger educational system? Who else

belongs in the community of design–University students? Teachers? Children? Parents? Administrators? Citizens in general?

The pragmatist concept of inquiry also calls us to look at the multiple forms of experience. This project is unusual and commendable for its inclusion of aesthetic aspects of experience, critical thinking, and self-assessment. But new technologies invite us to consider ideas for extending learning, well beyond the use of new media for organizing and presenting content. In that sense, the triad of pedagogy, content, and technology may limit us, because it suggests looking most closely at the intersection of these activities, rather than the ways that each may be transformed through the processes of inquiry. How might new technologies extend learning beyond the classroom to social action? How could/should they promote global thinking by direct connections across nations? How are disciplines themselves being transformed in ways that demand we think not of teaching the old more effectively, but of teaching entirely new things? How might the use of new technologies promote a more effective critique of the very technologies we use and the technological work we inhabit?

The communities of design project exemplifies important aspects of inquiry in the sense intended by Dewey and other pragmatists. Those early theorists saw inquiry, not simply as a means to learn something, but as the action of purposive organisms engaged in both understanding and changing the world around them. Faculty in the project could not be content with trivial uses of new technologies, nor could they spend time studying techniques that had little relevance to the pedagogy and content of their disciplines. Instead, they had to become active creators of meaning.

In much earlier work, Andee Rubin and I argued as follows (1993, p. 218):

> Our study shows that the process of re-creation of the innovation is not only unavoidable, but a vital part of the process of educational change. Critical analysis of re-creations needs to be an important part of any evaluation. We believe that a deeper understanding of this process will highlight the fact that teachers need more support in attempting these re-creations. Their role in the innovation process is as innovators, not as recipients of completed products.

The project shows how faculty can re-create, not simply accept innovations, even powerful ones such as digital video or problem-based learning. It shows the value of engaging learners as full participants in the learning process–as designers, evaluators, and decision makers. These engaged inquirers come to understand details of the technology, the value of a support system, the choices inherent in balancing technology with other educational needs, and the potentials for learning in a much deeper way than would otherwise be possible.

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