



visible knowledge project

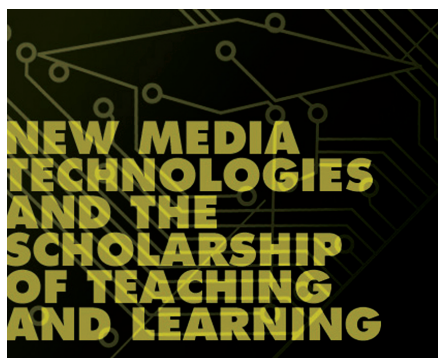
a collaborative investigation of learning, inquiry, and technology



The Difference that Inquiry Makes:

A Collaborative Case Study of Technology and Learning,
from the Visible Knowledge Project.

Edited By Randy Bass & Bret Eynon



"The Difference that Inquiry Makes: A Collaborative Case Study of Technology and Learning, from the Visible Knowledge Project," *edited by Randy Bass and Bret Eynon*

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Synthesis Essay for *The Difference that Inquiry Makes: A Collaborative Case Study on Technology and Learning, from the Visible Knowledge Project*¹,
edited by Randy Bass and Bret Eynon

Déjà 2.0

Facebook. Twitter. Social media. YouTube. Viral marketing. Mashups. Second Life. PBWikis. Digital Marketeers. FriendFeed. Flickr. Web 2.0. Approaching the second decade of the twenty-first century, we're riding an unstoppable wave of digital innovation and excitement. New products and paradigms surface daily. New forms of language, communication, and style are shaping emerging generations. The effect on culture, politics, economics and education will be transformative. As educators, we have to scramble to get on board, before it's too late.

Wait a minute. Haven't we been here before? Less than a decade ago, we rode the first wave of the digital revolution—email, PowerPoint, course web pages, digital archives, listservs, discussion boards, etc. As teachers and scholars, we dove into what is now called Web 1.0, trying out all sorts of new systems and tools. Some things we tried were fabulous. Others, not so much. Can we learn anything from that experience? What insights might we garner that could help us navigate Web 2.0? How can we separate the meaningful from the trivial? How do we decide what's worth exploring? What do we understand about the relationship of innovations in technology and pedagogy? What can we learn about effective ways to examine, experiment, evaluate, and integrate new technologies in ways that really do advance learning and teaching?

The teaching and research effort of the Visible Knowledge Project (VKP) could be a valuable resource as we consider these questions. Active from 2000 to 2005, VKP was an unusual collective effort to initiate and sustain a discipline-based examination of the impact of new digital media on education. A network of around seventy faculty from twenty U.S. colleges, primarily from American history and culture studies departments, gathered not only to experiment with new technologies in their

¹ About VKP: In all, more than seventy faculty from twenty-two institutions participated in the Visible Knowledge Project over five years. Participating campuses included five research universities (Vanderbilt University, the University of Alabama, Georgetown University, the University of Southern California, Washington State University, and the Massachusetts Institute of Technology), four comprehensive public universities (Pennsylvania's Millersville University, California State University (CSU)--Monterey Bay, CSU Sacramento, Ohio's Youngstown State University, and participants from several four-year colleges in the City University of New York system, including City College, Lehman, and Baruch), and three community colleges (two from CUNY--Borough of Manhattan Community College and LaGuardia Community College, and California's Cerritos College). In addition to campus-based teams, a number of independent scholars participated from a half dozen other institutions, such as Arizona State and Lehigh University. The project began in June 2000 and concluded in October 2005. We engaged in several methods for online collaboration to supplement our annual institutes, including an adaptation of the digital poster-tool created by Knowledge Media Lab (Carnegie Foundation), asynchronous discussion, and web-conferencing. The VKP galleries and archives (<https://digitalcommons.georgetown.edu/blogs/vkp/>) provide a wealth of background information, including lists of participants, regular newsletters, and reports and essays by participants, as well as a number of related resources and meta-analyses.

teaching, but also to document and study the results of their inquiries, using the tools of the scholarship of teaching and learning. In this collaborative and synoptic case study, under the title *The Difference that Inquiry Makes*, we try to capture and make sense of the visible evidence of this relatively invisible learning as it emerged over five (and more) years of collaborative classroom inquiry. We share participants' reports on key elements of the VKP inquiry, and integrate their reports into a framework that can help us learn from this experience as we navigate a fast-changing educational landscape.

Invisible Learning

What do we mean by "invisible learning?" We use this phrase to mean at least two things. First, it points us to what Sam Wineburg, in his book *Historical Thinking and Other Unnatural Acts*, talked about as "intermediate processes," the steps in the learning process that are often invisible but critical to development.² All too often in education, we are focused only on final products: the final exam, the grade, the perfect research paper, mastery of a subject. But how do we get students from here to there? What are the intermediate stages that help students develop the skills and habits of master learners in our disciplines? What kinds of scaffolding enable students to move forward, step by step? How do we, as educators, recognize and support the slow process of progressively deepening students' abilities to think like historians and scholars? In VKP, from the beginning, we tested our conviction that digital media could help us to shine new light on—to make *visible*—and to pay new attention to these crucial stages in student learning.

Second, by invisible learning we also mean the aspects of learning that go beyond the cognitive to include the affective, the personal, and issues of identity. Cognitive science has made great strides in recent years, scanning the brain and understanding everything from synapses and neurons to perception and memory. Educators are still struggling to grasp the implications of this research for teaching and learning. However, perhaps because it is less "scientific," higher education has paid considerably less attention to (and is even less well prepared to deal with) the role of the affective in learning and its relationship to the cognitive. How does emotion shape engagement in the learning process? How do we understand risk-taking? Community? Creativity? The relationship between construction of knowledge and the reconstruction of identity? In VKP we explored the ways that digital tools and processes surfaced the interplay between the affective and the cognitive, the personal and the academic.

Visible Evidence

Education at all levels has largely taken on faith that if teachers teach, students will learn—what could be seen as a remarkable, real-life version of "If you build it, they will come." In recent years, calls for greater accountability have produced a new emphasis on standardized testing as the only appropriate way to assess whether students are learning. Meanwhile, growing numbers of faculty in higher education have taken a different approach, engaging in the scholarship of teaching and learning—using the tools of scholarship to study their own classrooms—to deepen their understanding of the learning process and its relationship to teacher practice. Spurred by the ideas of Ernest Boyer and Lee Shulman of the Carnegie Foundation for the Advancement of Teaching, faculty from many disciplines

2 Sam Wineburg, *Historical Thinking and Other Unnatural Acts* (Philadelphia: Temple University Press, 2001).

have posed research questions about student learning, gathered evidence from their classrooms, and gone public with their findings in countless conference presentations, course portfolios, and scholarly journals. This movement, with its focus on classroom-based evidence, provided key tools and language for the Visible Knowledge Project. It allowed VKP faculty to study the impact of new technologies on learning and teaching, and it also helped us frame questions about problems and practice, inquiry and expertise that remain critical as we move into a new phase of technological innovation and change.³

The Visible Knowledge Project

The Visible Knowledge Project emerged in 2000 from the juxtaposition of these two powerful yet largely distinct trends in higher education—the scholarship of teaching and learning movement and the initial eruption of networked digital technologies into the higher education classroom. Responding to a dynamic combination of need and opportunity, faculty engaged in multi-year teaching and learning research projects, examining and documenting the ways the use of new media was reshaping their own teaching and patterns of student learning. Participating faculty came from a wide range of institutions, from community colleges and private liberal arts colleges to research universities; from Georgetown and USC to Youngstown State, the University of Alabama, and City University of New York (CUNY). Meeting on an annual basis, and interacting more frequently in virtual space, we formed our research questions representing a broad spectrum, shared ideas about research strategies, discussed emerging patterns of our evidence, and formulated our findings. The digital resources used ranged from Blackboard and PowerPoint to interactive online archives and Movie Maker Pro. The VKP galleries (<https://digitalcommons.georgetown.edu/blogs/vkp/>) provide a wealth of background information, including lists of participants, regular newsletters, and reports from more than thirty participants, as well as a number of related resources and meta-analyses.⁴

The VKP ethos was formed by a belief in the value of messiness, of unfolding complexity, of adventurous, participant-driven inquiry that would inform the nature of the collective conversation. A few scientists and social scientists entered the group and helped create exciting projects, but the vast majority of the participants were from the fields of history, literature, women's studies and other

3 Many good resources exist on the scholarship of teaching. Two essential resources can be found at the Carnegie Foundation for the Advancement of Teaching (<http://www.carnegiefoundation.org/CASTL/>) and the Scholarship of Teaching and Learning tutorial at Indiana University, Bloomington (<http://www.issotl.org/tutorial/sotltutorial/home.html>).

4 In all, more than seventy faculty from twenty-two institutions participated in the Visible Knowledge Project over five years. Participating campuses included five research universities (Vanderbilt University, the University of Alabama, Georgetown University, the University of Southern California, Washington State University, and the Massachusetts Institute of Technology), four comprehensive public universities (Pennsylvania's Millersville University, California State University (CSU)--Monterey Bay, CSU Sacramento, Ohio's Youngstown State University, and participants from several four-year colleges in the City University of New York system, including City College, Lehman, and Baruch), and three community colleges (two from CUNY--Borough of Manhattan Community College and LaGuardia Community College, and California's Cerritos College). In addition to campus-based teams, a number of independent scholars participated from a half dozen other institutions, such as Arizona State and Lehigh University. The project began in June 2000 and concluded in October 2005. We engaged in several methods for online collaboration to supplement our annual institutes, including an adaptation of the digital poster tool created by Knowledge Media Lab (Carnegie Foundation), asynchronous discussion, and Web-conferencing. For more detailed information, see the VKP galleries and archives at <https://digitalcommons.georgetown.edu/blogs/vkp/>.

humanist disciplines. While technology was key to our *raison d'être*, our inquiries often evolved to focus on issues of pedagogy that transcended individual technologies. We wanted to learn about teaching, to learn about learning. We wanted to go beyond “best practice” and “what worked” to get at the questions about why and how things worked—or didn’t work. In some cases, we went further, rethinking our understanding of what it meant for something to “work.” Our questions were evolving, shaped by the exigencies of time and funding as well as our on-going exchange and new technological developments. We struggled with ways to nuance and realize our inquiries, to come up with workable methods and evidence that matched our changing and, we hoped, increasingly sophisticated questions.

Over the course of the Project, we found that participants’ teaching experiments started to group in three areas:

1. *Reading—Engaging ideas through sources/texts:* As VKP took shape at the end of the twentieth century, the great museums, universities, and research libraries of this country were mounting their collections on the Web. Web sites such as the American Memory Collection of the Library of Congress vastly expanded the availability of archival source materials on the Web. It was a time, as Cathy Davidson put it recently, of digitally-driven “popular humanism.”⁵ Responding to this opportunity, VKP’s historians and culture studies faculty explored the effectiveness of active reading strategies using primary sources, both textual and visual, for building complex thinking. Introducing students to the process of inquiry, faculty tested combinations of pedagogy and technology designed to help students “slow down” their learning, interpret challenging texts and concepts, and engage in higher order disciplinary and interdisciplinary practices.

For example, Susan Butler, teaching an introductory history survey at Cerritos College, had her students examine primary sources on different facets of the Trail of Tears, made available online by the Great Smoky Mountains National Park, PBS, and the *Cherokee Messenger*; as students grappled with perspective and the evolving definition of democracy in America, Butler examined evidence of the ways that scaffolded learning modules that incorporated online primary sources could expand students’ capacity for critical analysis. Meanwhile, Sherry Linkon at Youngstown State used online archives to help students in her English course create research papers that contextualized early twentieth-century immigrant novels. And Peter Felten at Vanderbilt integrated online texts, photographs and videos into a history course on the 1960s, analyzing the ways students did—or didn’t—apply critical thinking skills to visual evidence.

Across the board, the focus was less on “searching” and “finding” than on analyzing, understanding, and applying evidence to address authentic problems rooted in the discipline. Testing innovative strategies, faculty asked students to model the intellectual behaviors of disciplinary experts, focusing earlier and more effectively on the learning dimensions that characterize complex thinking. (For sample projects addressing these questions, see http://cndls.georgetown.edu/crossroads/vkp/themes/poster_showcase_reading.htm)

5 Cathy N. Davidson, *Humanities 2.0: Promise, Perils, Predictions*, *PMLA* 123, no. 3 (May 2008): 711.

2. *Dialogue–Discussion and writing in social digital environments:* As VKP faculty moved into the world of Blackboard and Web-CT, they explored ways that discussion and social writing in online environments can foster learning. Projects explored strategies for using online communication to make the intermediate processes of learning more visible and to provide opportunities for students to develop personal and academic voice. For example, Mills Kelly, teaching a Western Civilization survey at Virginia's George Mason University, focused on the possibilities of using online tools, including the WebCT discussion board and a special GMU Web Scrapbook, as tools for enhancing collaborative learning. Meanwhile, Ed Gallagher at Lehigh University tested the impact of his detailed and creative guidelines for students in prompting more interactive and substantial discussion in an online context.

In general, carefully structured online discussion environments provided students and faculty a context in which to think socially; they also allowed discussion participants to document, retrieve and reflect on earlier stages of the learning process. This ability to “go meta” offered a new way for students and faculty to engage more deeply with disciplinary content and method. Highlighting the scaffolding strategies that might maximize student learning, these projects gathered evidence of learning that reflected the social and affective dimensions of these digitally-based pedagogical practices. (For sample projects, see http://cndls.georgetown.edu/crossroads/vkp/themes/poster_showcase_discussion.htm)

3. *Authorship–Multimedia construction as experiential learning:* As multimedia authoring became easier to master in these years, faculty became interested not only in creating multimedia presentations and Web sites; they also sought to develop ways to put these tools into the hands of students. Many VKP scholar-teachers were guided by the constructivist notion that learning deepens when students make knowledge visible through public products. In the projects clustered here, student authorship takes place in various multimedia genres of the early twenty-first century, including digital stories and digital histories, Web sites and PowerPoint essays, historically-oriented music videos, electronic portfolios and other historical and cultural narratives. The emergent pedagogies explored by these scholar-teachers involve multiple skills, points of view, and collaborative activities (including peer critique). For example, Patricia O'Connor had her Appalachian literature students at Georgetown University create Web pages about Dorothy Allison's *Bastard Out of Carolina*, annotating particular phrases and creating links to historical sources and images, while she investigated the ways that “associative thinking” shaped students' ability to make nuanced speculations about literary texts.

Meanwhile, Tracey Weis at Pennsylvania's Millersville University and several faculty at California State University at Monterey Bay gathered evidence on the cognitive and emotional impact of student construction of short interpretative “films,” or what we came to call “digital stories.” Examining the qualities of student learning evidenced through such assignments, these projects spotlight issues of assessment and the need to move beyond the narrowly cognitive quiz and the critical research essay to find ways to value creativity, design, affect, and new modes of expressive complexity. (For sample projects, see http://cndls.georgetown.edu/crossroads/vkp/themes/poster_showcase_writing.htm)

Naturally, these three areas of classroom practice—critically engaging primary sources, social dialogue, and multimedia authorship—converged in all kinds of ways. Some of the richest and most intriguing

projects engaged students in a scaffolded process of collaborative research and writing, laying the groundwork for multimedia-enhanced performances of their learning. Our fluid categories were defined and redefined by the creativity of our faculty as they experimented within them.

The key to faculty innovations in VKP was not merely trying new teaching strategies but looking closely at the artifacts of student work that emerged from them, not only in traditional summative products such as student writing, but in new kinds of artifacts that captured the intermediate and developmental moments along the way. What did these artifacts look like? They included video evidence of students working in pairs on inquiry questions, as well as student-generated Web archives and research logs; they included careful analysis of discussion threads in online spaces and student reflections on collaborative work; they included not only new forms of multimedia storytelling but evidence of their authoring process through interviews and post-production reflections about their intentions and their learning. One of the consequences emerging from these new forms of evidence was that, as faculty looked more closely and systematically at evidence of learning processes, those processes started to look more complex than ever. The impact of transparency, at least at first, seemed to be complexity, which can be unsettling in many ways.

Pieces of Insight

This phenomenon had a significant impact on the kinds of findings and claims that emerged from this work. We set out looking for answers (“what is the impact of technology on learning?”) and what we mostly found were limited claims about impact, new ways of looking at student learning, and often dynamic new questions. In fact, the VKP projects followed a pattern typical in faculty inquiry. Whatever the question that initiates the inquiry, it often changes and deepens into something else. For example, Lynne Adrian (University of Alabama) started off investigating the role of personal response systems (“clickers”) in a large enrollment Humanities course to see if the use of concept questions would increase student engagement, but was soon led to reflect much more interestingly on the purpose of questions in class and the very nature of the questions she had been asking for more than twenty years. Similarly, Joe Ugoretz (Borough of Manhattan Community College), in an early inquiry, hoped to study the benefits of a free-form discussion space in an online literature course, but got frustrated because the students would frequently digress and stray off topic; finally it occurred to him that the really interesting inquiry lay in learning more about the nature of digressions themselves, considering which were productive and which were not. The changing nature of questions, and the limited nature of claims, is not a flaw of faculty inquiry but its very nature. John Seely Brown describes the inevitable way that we build knowledge around teaching: “We collect small fragments of data and struggle to capture context from which this data was extracted, but it is a slow process. Context is sufficiently nuanced that complete characterizations of it are extremely difficult. As a result, education experiments are seldom definitive, and best practices are, at best, rendered in snapshots for others to interpret.”⁶

Here is where the power of collaborative inquiry came into play. That is, what emerged from each individual classroom project was a piece of insight, a unique local and limited vision of the relationship between teaching and learning that yet contributed to some larger aggregated picture. We had,

6 John Seely Brown, “Foreword,” in *Opening Up Education: The Collective Advancement of Education through Open Technology, Open Content, and Open Knowledge* (Cambridge: MIT Press, 2008).

in the microcosm of the Visible Knowledge Project, created our own “teaching commons” in which individual faculty insights pooled together into larger meaningful patterns.⁷ Each of these snapshots is interesting in itself; together they composite into something larger and significant. What follows below is our effort at putting together the snapshots to create a composite image in which we recognize new patterns of learning and implications for practice.

A Picture of New Learning: Cross-Cutting Findings

Collectively, what emerged from this work was an expansive picture of learning. Although we started out with questions about technology, early on it became clear that the questions were no longer merely about the “impact of tools” on learning; the emergent findings compelled us to confront the very nature of what we recognized as learning, which in turn fed back into what we were looking for in our teaching. Over the years, faculty experienced iterative cycles of innovation in their teaching practice, of reflection on an increasingly expansive range of student learning, and of experimentation shaped by the deepening complexity (and at times befuddlement) that emerged from trying to read the evidence of that learning. From this spiral of activity developed a research framework with broad implications for the now-emergent Web 2.0 technologies. We have come to articulate this range of cross-cutting findings under the headings of three types of learning: *adaptive*, *embodied*, and *socially situated*.

Briefly, by *adaptive* learning we mean the skills and dispositions that students acquire which enable them to be flexible and innovative with their knowledge, what David Perkins calls a “flexible performance capability.”⁸ An emphasis on adaptive capacities in student learning emerged naturally from our foundational focus on visible intermediate processes. What became *visible* were the intermediate intellectual moves that students make in trying to work with difficult cultural materials or ideas, illuminating how novice learners progress toward expertise or expert-like thinking in these contexts.

Our recognition of the embodied nature of learning emerged from this increased attention to intermediate processes—the varied forms of invention, judgment, reflection—when we realized that we were no longer accounting for simply cognitive activities. Many manifestations of the affective dimension of learning opened up in this intermediate space informed by new media, whether it was the way that students drew on their personal experience in social dialogue spaces, or the sensual and emotional dimensions of working with multimedia representations of history and culture. In these intermediate spaces, dimensions of affect such as motivation and confidence loomed large as well. We have come to think of this expansive range of learning as embodied, in that it pointed us to the ways that knowledge is experienced through the body as well as the mind, and how intellectual and cognitive thinking are embodied by whole learners and scholars.

Inasmuch as this new learning is embodied, similarly is it *socially situated*. Influenced by the range of work on situated learning, communities of practice, and participatory learning, our work with new technologies continuously brought us to see the impact new forms of engagement through media had on the students’ relative *stance* to learning. This effect was not merely a sense of heightened interest due to the novelty of new forms of social learning. Rather, what we were seeing was

7 For a broader discussion of the “teaching commons,” see Pat Hutchings and Mary Huber, *The Advancement of Learning: Building the Teaching Commons* (San Francisco: Jossey-Bass, 2005).

8 David Perkins, “What is Understanding?” in *Teaching for Understanding: Linking Research with Practice*, ed. Martha Stone Wiske (San Francisco: Jossey-Bass, 1998), 39-58.

evidence of the ways that multimedia authoring, for example, constructed for students a salient sense of audience and public accountability for their work; this, in turn, had an impact on nearly every aspect of the authoring process—visible in the smallest and largest compositional decisions. The socially situated nature of learning became a summative value, capturing what Seely Brown calls “learning to be,” beyond mere knowledge acquisition to a way of thinking, acting, and a sense of identity.

These three ways of looking at pedagogies—as adaptive, embodied, and socially situated—together help constitute a composite portrait of new learning. Each helps us focus on a different dimension of complex learning processes: adaptive pedagogies emphasizing the developmental stages linking learning to disciplines; embodied pedagogies focusing on how the whole person as learner engages in learning; and socially situated learning focusing on the role of context and audience. In this sense, the dimensions are overlapping and reinforcing in any particular set of practices. For example, consider Patricia O’Connor’s work making use of Web authoring tools to lead students to engage in close reading of print fiction. Calling the activity “hypertext amplification,” O’Connor asks students to make increasingly sophisticated “associational” connections, to move from novice reading encounters with texts to more expert ones. She wants them to experience “associational thinking” on multiple levels, from the personal and emotional to the definitional and critical. Ultimately, students’ ability to engage fully along a continuum of expert practice is shaped by their knowledge that their Web pages will be public, and their presentations to their peers a social act. All three key dimensions are in play in her teaching practices, as in so many of the case studies coming out of VKP.

Nevertheless, we believe it is a valuable exercise to slow down and look closely at each of three areas, and to begin making sense of how each dimension might be better understood for its shaping influence on learning. We now explore each of these areas more fully below.

A Note on Findings

Because faculty inquiry lives at the boundary of theory and practice, we have chosen to present the findings in two forms: as *conceptual findings* (representing the way theory informed practice, and vice versa) and *design findings* (representing some of the key claims on practice made by these concepts and values about learning). As a further response to the challenge of representing collective findings in a messy research environment, we also present each area with a set of “tags,” keywords that help associate the findings with various trajectories. Finally, at the end of each finding description we link to several relevant case studies within this volume.

Pedagogies of Adaptive Expertise

Conceptual finding: New media environments can make visible the *intermediate thinking processes* intrinsic to the development of expert-like abilities and dispositions in novice learners, and nurture abilities associated with *adaptive expertise* that allow practitioners (and learners) to make flexible use of knowledge in self-regulated ways. New media environments allow students to recognize layers of learning that lead to greater reflection and control over learning processes. New media pedagogies engage novice learners in foundational aspects of expert thinking, difficult to address in other ways. Students’ intellectual development in relationship to expert thinking traditionally has been invisible to higher education.

From the beginning of VKP, we were influenced by the burgeoning research on expertise. The 1999 publication of *How People Learn* (Bransford, et al.) made the previous thirty years of research on expert thinking available to a wider group of educators. That volume laid out basic differences between expert and novice thinking.⁹ We were especially interested in its broadened definition of the kinds of knowledge experts possess: formal and procedural knowledge (traditionally emphasized in college), as well as informal, experiential, and self-regulating knowledge. The salient characteristics of experts, who are “comfortable working at the edge of their competency” and who are particularly good at “progressive problem-solving” that allows them to move forward with uncertainty (Bereiter and Scardamalia), struck us as particularly relevant, given our focus on new media pedagogies. We also came to see the importance of newer work on what is commonly referred to as “adaptive expertise,” traits linked to innovation and resilience in complex problem-solving.¹⁰

By focusing on expertise, we were not suggesting that all students should (or could) be turned into “experts.” What mattered to us were questions about how to contextualize the introduction of novice learners to structures of authentic learning in disciplines. What kind of values about learning and thinking should inform our designs? What was it about the affordances of new media environments that both enabled and compelled us to reevaluate the ways we cultivated “judgment in uncertainty?”¹¹

Our findings about expertise and new media pedagogies disrupt in at least two ways the developmental assumptions that typically inform curricular and assessment practices: 1. by suggesting the need to emphasize earlier, for novice learning, certain elements of developmental expert thinking often thought to require years of accumulated learning (for example, putting students in positions to make judgments about primary source research or multimedia authoring even if they lack the knowledge to “correctly” represent all aspects of a subject;) and 2. by prompting us to rethink assumptions about how we assess student progress along this developmental journey, compelling us to find better ways of offering students evaluative judgments on their representations of these intermediate processes.

Design findings: VKP case studies pointed to several important design considerations for teachers trying to realize the potential of visible intermediate processes on the development of adaptive expertise. In general, faculty must make room for uncertainty, openness to multiple paths, reflection, and

9 For example, experts notice patterns not noticed by novices; expert knowledge is organized in ways that reflects their domain; expert knowledge is “conditionalized” (not about isolated facts but situated in ways that new data make sense in larger contexts); experts are flexible and fluent with their knowledge. See John Bransford, et. al., *How People Learn: Brain, Mind, Experience, and School* (National Academy Press, 1999). Other work on expertise has looked, not at the differences between experts and novices, but at the differences between practicing experts and practicing non-experts. See Carl Bereiter and Marlene Scardamalia, *Surpassing Ourselves: an Inquiry into the Nature of Expertise* (Open Court Publishing Company, 1993).

10 Giyoo Hatano and Yoko Oura, “Commentary: Reconceptualizing School Learning Using Insight From Expertise Research,” *Educational Researcher* 32, no. 8 (2003): 26-29, <http://edr.sagepub.com/cgi/content/abstract/32/8/26>; S. Brophy, L. Hodge, and J. Bransford, “Work in progress--adaptive expertise: beyond apply academic knowledge,” *Frontiers in Education* 3 (FIE 2004, 34th Annual, 2004): S1B/28- S1B/30, http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=1408679.

11 See for example, Lee Shulman, “Pedagogies of Uncertainty,” *Liberal Education* (Spring 2005), <http://www.aacu.org/liberal-education/le-sp05/le-sp05feature2.cfm>, and William Sullivan and Matthew Rosin, *A New Agenda for Higher Education: Shaping a Life of the Mind for Practice*, (Jossey-Bass, 2008).

productive iteration. Additionally, faculty who design for adaptive expertise in new media environments found that they needed to create new ways to capture the artifacts of student learning that reflect expert processes. These are inherently distinct from traditional summative assessments. Five design findings are elaborated below:

>Designing for adaptive expertise means recognizing what is “necessarily difficult” about a field.

When David Jaffee (City College of New York) says that he wants his students in his U.S. history class to “think visually,” he addresses a difficulty confronting the discipline. He designs student experiences with primary materials in digital archives with this goal in mind:

When a student searches through a greater variety of materials, pulls apparently unconnected texts into a relationship, and constructs a plausible story from those student-located and selected models, she models the practice of an ‘expert’ or professional historian who enters an archive with a series of questions and perhaps a tentative hypothesis in search of evidence. It was such moments that slowly revealed my own far greater interest in having the students ‘to think visually as historians,’ indeed to ‘do history,’ rather than merely add images to the potpourri of sources included in the course mix. (Jaffee)

Throughout the classroom inquiry projects, faculty went beyond disciplinary knowledge and habits of mind, wrestling with ways the “necessarily difficult” dimensions of a field could reshape their pedagogical designs.¹²

The focus on engaging difficulty emerged across the whole range of VKP classrooms. In teaching a basic skills reading class to EFL students, Sharona Levy (Borough of Manhattan Community College) developed a teaching strategy designed to make levels of difficulty visible to her students, including those who struggled to read complex texts. Making use of the “comment” feature in Word as a type of “think aloud” strategy, Levy asks students to mark the troublesome places in a historical text (such as a letter from George Washington to the Continental Congress) as falling in one of three categories of “difficulty:” words they don’t know; terms that seem confusing as used; and concepts that seem enigmatic or particularly complex. By engaging the text this way, her students—who would typically construe difficulty as their own undifferentiated failure—were able to separate out moments of difficulty that were merely a matter of vocabulary, for example, from those that would pose interpretive difficulty for any reader (Levy).¹³ Instead of experiencing a sweeping sense of failure in their reading, Levy’s students were able to begin working with texts as more expert readers: compartmentalizing issues of decoding from more complex tasks of interpretation.

¹² James F. Slevin, *Introducing English: Essays in the Intellectual Work of Composition* (Pittsburgh: University of Pittsburgh Press, 2001).

¹³ Levy’s work builds on the pioneering work on difficulty developed by Mariolina Salvatori, and then Salvatori and Patricia Donahue, who found that given the opportunity to make their sense of difficulty visible, students discover that much of what they find difficult in complex texts are indeed often “textual cruxes.” See for example Mariolina Salvatori, “Difficulty: The Great Educational Divide,” *Opening Lines: Approaches to the Scholarship of Teaching and Learning* (Carnegie Publications, 2000) and Mariolina Salvatori and Patricia Donahue, *The Elements (and Pleasures) of Difficulty (The Elements of Composition)* (Upper Saddle River, New Jersey: Pearson Education, 2004).

As teachers, we so often value dimensions of students learning that we do not actively design to produce. Many teachers value their students engaging what is most difficult about their fields; the challenge we saw emerging in VKP was how to intentionally pursue this goal: how to design for difficulty. Faculty engaged in classroom inquiry often discover this gap between what they value and what they explicitly include in assignments. Looking closely at student learning processes helped faculty reorient their design priorities to emphasize intermediate activities addressing the difficult dimensions of disciplinary thinking.

>Designing for adaptive expertise requires allotting time for intellectual play and uncertainty.

We found that designing for difficulty meant providing substantial time for exploration, experimentation with ideas, and uncertainty. In fact, a key outcome of linking difficulty with a robust definition of expertise (and expert processes) is to call into question traditional notions of rigor, to privilege time and space for activity that initially looks decidedly non-expert. In her study of student learning in an honors course in arts literacy, Paula Berggren (Baruch College) had one of those moments that shifts a teacher's perspective. After weeks of asking formal questions about the arts and getting strained responses, she began a new unit with an online discussion question about "why people dance." What ensued was a torrent of student responses, at first glance free-form and at times rambling. However, upon close analysis, Berggren realized that the postings displayed many of the intellectual principles of arts literacy that she was hoping to cultivate all along, albeit informally and incompletely shaped. The episode revealed to her the power of an open discussion space for students to engage a question (Why do people dance?) that stood at the boundary between their course's academic topic (the arts), the related disciplinary discourse, and the students' personal experiences. The value of such timely questions unfolding in a technology-enhanced context that affords room to play emerged over and over again in our classroom inquiries.

The fundamental insight to be emphasized here is the linkage between flexible space for intellectual play and the development of disciplinary expertise. Examining the value of online discussion spaces in a biology and literature course, respectively, Heidi Elmendorf and John Ottenhoff discovered that "one of the key signs of intellectual play within the online discussions that emerges during the semester is the students' comfort with ambiguity and their ability to play with and build upon ideas that are not certain (deferring true understanding)...This flexibility of cognitive engagement is an important accomplishment—and a critical embodiment of expert behavior—for students who begin the semester by seeing texts as sources of compartmentalized knowledge, not as opportunities for expansion and questioning."¹⁴

VKP faculty put students in positions of freedom. But they found it critical to carefully scaffold these open experiences. Navigating between being too restrictive and too vague, many VKP studies analyzed the effectiveness of particular scaffolds in cultivating authentic learning. Taimi Olsen (Tusculum College) studied the ways her students conduct research on the Web. Research, archival or otherwise, is an important site for engaging novice learners in expert-like activity, posing challenges of open and authentic work balanced by scaffolded guidance. In her study, Olsen is particularly interested in the relationship between *serendipity* (the accidents of research discovery intrinsic to the scholar's experience) and *reflective judgment* (the small, intermediate moments when students make decisions about the appropriateness of a source or the generative quality of a research direc-

¹⁴ Heidi Elmendorf and John Ottenhoff, "The Importance of Conversation in Learning and the Value of Web-based Discussion Tools," *Academic Commons* (January 2009), <http://www.academiccommons.org/commons/essay/importance-conversation-learning>.

tion). Through her own cycles of inquiry, Olsen came to appreciate the importance of scaffolding to produce both experiences, creating specific parameters for the way students search for materials and how they record and reflect on that research. Through her inquiry, Olsen came to see what many other VKP faculty discovered: that the development of *disciplinary* skills largely takes place in these intermediate moments of reflective judgment. We cannot expect students to cultivate the capacity for such judgment unless we put them in structured scenarios with freedom of decision, building awareness of the consequences of better or worse judgment.

>Designing for adaptive expertise must include ways of capturing intermediate processes through student work.

If we value the intermediate learning processes that lead to summative student work, then we have to invent new ways both to foster activity in those intermediate spaces and to capture evidence of them. VKP faculty were struck by what could be learned from listening to students as they work in these intermediate spaces. Taimi Olsen found that if she gave weight to “research skills” as a real goal of her teaching, then she had to find meaningful ways of coaching those skills. She asks her students to keep research logs and to turn in copies of their sources with marginalia, generating important evidence of student thinking and development. In her inquiry, student marginalia constitute an important source of evidence of student reflective judgment. Revealing student rationale, these notes often gave a reasoned basis for choices that otherwise appeared at odds with Olsen’s own biases about sources. Careful reading of marginalia may not be for all faculty, but Olsen’s commitment to it suggests ways we must rethink the location of student learning.

Online discussion spaces, including emergent Weblog and wiki environments, also provide promising venues for intermediate processes. VKP studies explored how to move beyond conversational activity, creating occasions for students to harvest learning from the visibility of their own thinking. In Ed Gallagher’s initial inquiry project (Lehigh University), he decided that the ability to “enter the conversation” in a disciplinary context was a fundamental academic goal. Putting his course design where his principles were, Gallagher redesigned an American Literature course to center around an online discussion board, where 100% of the grade was based on discussion-intensive participation. A critical component for student learning was what Gallagher called their “meta-work:” each week, students had to reread and reflect on their best contributions and compare their own judgments with the professor’s. Olsen and Gallagher’s projects are two among many where faculty focused on new sites for gathering evidence of student progress taking advantage of the ways digital spaces made these processes visible.

>Designing for adaptive expertise necessitates developing new ways to read and assess student work.

If designing for intermediate processes requires new places to look for evidence, it similarly compels us to find new ways of looking. Despite the shift in the last fifteen years around active learning and the use of online tools to engage such activity, we (as a higher education community) have made comparatively little progress on changing our summative assessments of student learning. Expanding our criteria for assessment is a further logical consequence of attending to intermediate processes and abilities we associate with adaptive expertise. This in no way implies a lessening of standards but an important acknowledgment that we must recalibrate our evaluative judgments to the places in the developmental process we are most hoping to shape.

For some faculty engaged in these inquiries, this recalibration was modest. For example, judging the kinds of intellectual moves that should be rewarded Paula Berggren found there are “different rules for reading online postings” than for formal papers. Ed Gallagher changed the assessment criteria in his discussion-centered course experiment, privileging academic writing that opened up into conversation and invited response above superficially more competent but closed expository discourse. Focused on strategies for using online collaboration as tool for building writing skills, Juan José Gutiérrez, at CSU Monterey Bay, assigned nearly one-third of his course grade to students’ participation in a carefully structured peer review process.

But the implications may be more far-reaching. Thinking about the problem of assessment in the context of innovative new media practices led us to what we came to think of as “the cutting room floor problem.”¹⁵ Extended projects in digital environments—such as digital storytelling, documentary video production, multimedia authoring—often left faculty with the paradox that the richest evidence of student learning cannot be found in the final summative product (e.g. the five-minute multimedia narrative itself). Where is the learning in a process-driven authoring activity? In a twenty-page research paper, we want to believe that all the evidence of learning is in the final product. But what about a five-minute documentary video introducing the Tuskegee experiments to an audience who never heard of them? Where is the full evidence of that process? In many ways it is spread across a series of actions taken along the way and left on the cutting room floor, in the hundred decisions a student makes to include or exclude materials or effects, in all those reflective judgments made in the process of construction and (in some cases) the give and take of collaborative production. For many VKP faculty, this required rethinking “final projects” as compilations of a final assignment along with traces of the process, most commonly a reflection or series of reflections.

Such reflections can serve as a bridge between theory and practice. Rina Benmayor (CSU Monterey Bay) sees digital storytelling as a way to link theory and “the body” (personal experience and identity). Manifesting her thinking in her classroom activities, Benmayor developed a rich schema for evaluating student multimedia work on multiple levels—narrative, analytic, technical—and then had students reflect, explaining how their stories embody the theory they have been studying. Implemented repeatedly, over a series of semesters, her innovations allowed her to see how some students excel at certain dimensions and not at others; consequently, she was able to change, and in many ways, intensify her expectations, identifying the layers of their development and achievement.

The need for an expanded understanding of assessment will only increase with the expanded use of blogs, wikis, social bookmarking, virtual reality and simulation environments in education. Any pedagogy linking adaptive expertise to the kinds of processes made visible by new social tools especially depends on recognition of the increasingly expansive ways that previously invisible processes have status in artifacts and assessments. Participatory environments and constructive spaces offer us new ways to teach to adaptive learning and to access incremental stages of student development along the road to expert-like thinking. We can realize this potential only if we recognize how such spaces enable less than expert students to engage in “confronting and negotiating sites of understanding.”¹⁶ Assessing what happens when students with novice knowledge meet expert-level challenges is among the greatest imperatives faculty face in responding to the expanding field of visible evidence.

¹⁵ See Heidi Elmendorf, “Learning through Teaching: A New Perspective on Entering a Discipline,” *Change* (Nov/Dec 2006).

¹⁶ Bernie Cook, “Producing Audiovisual Knowledge: Documentary Video Production and Student Learning in the American Studies Classroom,” *Academic Commons* (January 2009), <http://www.academiccommons.org/commons/essay/documentary-video-production-and-student-learning>

Embodied Pedagogies:

Conceptual finding: In the late 1990s it was still a familiar critical refrain that digital environments were impersonal and distancing. Early on in VKP, however, compelling evidence emerged that led us to a very different conclusion. Students working in media-rich primary source archives found themselves particularly moved by photographs and film of the civil rights movement; students engaged in online discussion boards about works of literature found themselves embroiled in heated exchanges about the authority of their experiences in taking a stance on character and plot; students creating multimedia narratives found themselves empowered by the multi-sensory, multi-track tools at their disposal—music, images, timing, graphics—to convey their own complex combination of emotional and intellectual responses to some moving historical incident. VKP faculty found that new media technologies promoted the expansion of what we have come to call *embodied pedagogies*, inducing learning that engages affective as well as cognitive dimensions, not merely through the role of emotion, but through creativity and intuition, through expressions of self-identity and subjectivity as the foundation of intellectual engagement.

The importance of affect and the larger category of embodied pedagogies was one of the true surprises of the whole project. And it came to occupy a critical pivotal place in our emerging framework around learning, bridging the traits of adaptive expertise with the broader context of socially situated learning (discussed in the next section). We call these pedagogies *embodied* because their range of learning dimensions seem to counteract a longstanding Cartesian split between mind and body intrinsic to traditional higher education—a split that neatly compartmentalizes “the body” and the senses to the art or theater or dance or creative writing department, and generally banishes emotion from the classroom altogether. This split also underwrites a longstanding dichotomy, especially in the humanities, between creative and critical thinking.

Of course there are important precedents for forms of embodied pedagogies that have made their appearance in the last thirty years, feminist pedagogies being one of the best-developed examples. Also relevant, though not to be explored at length here, is the growing interest in emotional intelligence and learning styles. Having much in common with these approaches to linking the cognitive and affective in learning, what we saw from our work was a very diverse and almost ubiquitous resurgence of interest among the VKP faculty in emotional, subjective, and creative responses to intellectual and cognitive material. And we saw it emerge in ways that made these responses intrinsic to the digital media environments through which these pedagogies were enacted.

Attention to the affective and the creative disrupts deeply held assumptions and biases in higher education. Many are the skeptics who see attention to emotion (especially through music and media) as pandering to student preferences for popular culture and non-rigorous assignments, or to this generation of students’ interest in themselves. Yet, the evidence we saw across these projects indicates something more nuanced that complexly links the intricate relationship between emotional and epistemological understanding with the nature of new media pedagogies as an extension of a media-rich, post-literate cultural environment.

Gregory Ulmer named this post-literacy period “electracy,” referring to the current moment of history in which “the image” (broadly construed) is our new language apparatus. Just as literacy did not eliminate orality, but merely layered on top of it as the dominant paradigm, so too, Ulmer argues, has “electracy” layered on top of literacy. Nonetheless, he argues that in electracy, the image, not the word, drives our relationship to discourse. The implications of this go far beyond the need for

visual literacy or the better education around the protocols of visual media. Ulmer suggests that this changes the relationship of our identities to cognition, the epistemology of the disciplines, and cultural knowledge. As an example, he discusses how we might re-imagine the role of the first year writing course:

For example, general education writing courses . . . serve at least the following consensus needs, listed in order of current priority—methods for using the language to learn specialized knowledge; practices of rhetoric and logic required for citizenship in a democratic society; models of self-knowledge for living the examined life. We may assume that these needs continue in electracy, but that they will be articulated differently. There will be an inversion of the literate hierarchy; the first communication of an electrate person is reflexive, self-directed.¹⁷

The classroom inquiry projects of VKP stood at the boundary line of traditional literacies and Ulmer's "inversion of the literate hierarchy." In fact, one might say that VKP faculty often had a front-row seat on this transitional territory and read the signs and symptoms of it in the evidence of their inquiries.

At this seam, embodied pedagogies include conceptual findings around three major ideas: 1. The importance of self-knowledge and experience as a primary means of bridging the identity of learners with disciplinary knowledge; 2. The key role of the sensory impact of new media on learning, especially the emotional impact of music and the intimate power of visual, vocal, and video media; and 3. the significance of emotion and embodied cognition in intellectual development for the whole spectrum of expert development—as crucial in initial engagement as in more advanced stages of integrated understanding. These conceptual findings have specific implications in learning designs across the projects.

Design findings: What does it mean to design for embodied pedagogies, to account for the developmental role of affect in learning, and to engage the emotional dimension to activate other highly valued cognitive processes? The challenge here is not only to make room for emotional engagement, but to model how to engage emotion in cognitive and critical thinking. Faculty recognizing the importance of affect in new media pedagogies develop instructional and assessment tools to accommodate these fuller dimensions of learning, rethinking how knowledge construction is connected to self-construction, cognition to affect, and critical thought to creativity.

>Designing for embodied learning requires scaffolding ways for students to know more than they think they know—through exploration, invention, and reflection

When Paula Berggren studied her students' effusive responses to the online discussion about "why people dance," it reinforced for her the importance of experiential—even bodily—responses for forging connections to academic material. A couple of years later, that insight led her to make a seemingly unrelated innovation in an entirely different course. After many years of teaching Renaissance drama through traditional literary analysis, Berggren introduced an assignment where students developed group interpretations of key scenes, acted them out, videotaped them, then showed the video to their classmates and led a discussion around their peers' response to their interpretations. Like the informal dialogic social space of the discussion board, this assignment gives students the space to explore and invent their own responses to academic material through their bodily engagement; and

¹⁷ Gregory L. Ulmer, *Internet Invention: From Literacy to Electracy*. Upper Saddle River, New Jersey: Pearson Education, 2003.

video technology enables them make that invention both public (to their peers in this case) and an occasion for their own reflection. Online discussion boards and videotaping dramatic scene interpretation may seem very different, but not if, as in this case, we recognize the *embodied* connection between them.

VKP's digital projects were filled with examples of such pedagogies, enacted through some version of a sequence where digital media tools provided a flexible space to engage student interests and attention, a means to make that engagement visible to others, and a framework for students to reflect and make meaning out of their products. For example, using multimedia presentations as a way of teaching early childhood education, Rachel Theilheimer (Borough of Manhattan Community College) found that through the ability to make hyperlinks between their research and their own personal stories, "students were able to see that there was a range of thought on the actions and experiences of children, parents, and teachers, and they could see ways in which their own feelings about their early experiences could help them understand what researchers in the field had found and reported."¹⁸

We saw this pattern in many variations and with many different kinds of tools and contexts, whether it was students using hypertext to engage associative thinking as a way to develop close reading of texts (O'Connor), keeping public blogs while studying abroad to engage an ongoing sense of community and continuity of intellectual growth (Stephen), developing electronic portfolios to construct a public presentation of themselves as learners (Eynon), or constructing digital stories that connect personal and family history to cultural history (Benmayor; Coventry and Oppermann). Key to these and other pedagogies are the ways that, with the right guidance, new media environments can effectively be both inventive and reflective spaces for students—and must be if we are to see them as essential to the changing landscape in education.

>Designing for embodied learning means acknowledging the role of affect in the engagement of ideas and helping students to engage their emotions cognitively in digital environments.

Anne Cross (Metropolitan State) examines the role that "Music Video Projects" played in her Sociology course with topics like "domestic violence":

With topics like this—much like with the topic of race—it can be difficult to juggle scientific sociology with the need for students to address the topic in a personal way. Before the MVP [Music Video Project] was introduced, students were either tensely silent about relationship violence, or occasionally one student would talk anecdotally or inspirationally (often for too long) about a friend or relative who was abused and got help. Before the video project, students never seemed particularly interested in connecting the emotional stories with course concepts . . . the videos did what a textbook or a lecture could not. Tears flowed openly in the classroom and experiences were shared as the class discussed the problem as a social issue. The videos provided a neutral emotional release that made the difficult topics easier to discuss in terms of facts and theories.¹⁹

¹⁸ Joseph Ugoretz and Rachel Theilheimer, "Looking at Learning, Looking Together: Collaboration across Disciplines on a Digital Gallery" *Academic Commons* (January 2009), <http://www.academiccommons.org/commons/essay/collaboration-across-disciplines-digital-gallery>.

¹⁹ Peter Burkholder and Anne Cross, "Video Killed the Term Paper Star," *Academic Commons* (January 2009), <http://www.academiccommons.org/commons/essay/video-killed-term-paper-star-two-views>.

Most faculty can recall isolated anecdotes about emotional days in our classes, especially around volatile topics. Reflecting across our collaborative inquiry, we came to see this as more than anecdotal. Across multiple classes we saw an intrinsic phenomenon. It pointed to the ways that new media was intimate and visceral, due in large part to the multiple engagements of the senses—through music, color and design, and the immediacy that comes with visual and aural cultural artifacts and video-rich ways of experiencing the world. What emerged was a pattern of findings, framing how new media helps bridge the interior lives of students with intellectual material and the ways that emotion and personal responses becomes the portal through which students accessed new knowledge.

The work by VKP faculty around digital storytelling especially drove this home, including the “meta-study” conducted by Michael Coventry and Matthias Oppermann across a cohort of courses and students engaged in multimedia authoring. As they put it in their study in this volume, “digital storytelling works at the intersection of the emotional and epistemological aspects of learning, bridging story and theory, intellect and affect. For many students an emotional engagement with the topic—or a problem in the most generative sense of the word—is the point of departure that allows them to connect their stories to the relevant theories.” In multimedia authoring—and in many other kinds of pedagogies we saw across the project—emotions are not merely present but are “reclaimed cognitively,” serving a critical bridging function to expertise, as they “enable students to write themselves into existing discourses and to contribute personal perspectives to an academic community.”²⁰

>Designing for embodied learning requires expansive criteria for assessment that accommodates multiple learning dimensions.

As with the greater attention to intermediate processes, we cannot enact a broader definition of embodied learning and then constrain it through traditional summative assessment. If new media pedagogies are to expand, we must reconsider the ways that we assess student work. This is probably the most vexing area of new media pedagogies. Within the project, some VKP faculty developed rubrics that addressed the impact on learning of affect, creativity, and a more holistic sense of engagement. One of the most developed of these is Rina Benmayor’s (CSU Monterey Bay), where she uses digital stories and multimedia authoring as a way of helping students use their “personal experience as the subject of analysis” to facilitate learning in cultural theory. In her multi-dimensional rubric, Benmayor identifies three levels of theorizing—Narrative Theorizing, Applied Theorizing, and Critical Theorizing—representing a progression in sophistication and integration of the course’s ideas. These three areas are applied commonly across two different sets of criteria for evaluating written and multimedia texts: 1. typical cognitive or critical criteria, such as “Relation to larger social structures and ideologies;” and 2. embodied criteria such as “Emotional impact of the digital story.” Benmayor’s sophisticated assessment schema for embodied learning not only addresses learning that has traditionally “colored outside the lines” of higher education. It also recognizes the integrative function of embodied learning in a more holistic sense of intellectual development.

20 Michael Coventry and Matthias Oppermann, “Digital Stories: ”From Narrative to Database: Protocols and Practices of Multimedia Inquiry in a Cross-Classroom Scholarship of Teaching and Learning Study” *Academic Commons* (January 2009), <http://www.academiccommons.org/commons/essay/narrative-database>.

Socially Situated Learning

Conceptual finding: New media pedagogies are largely defined by the ways they can situate students in meaningful communities of fellow learners or practitioners. Socially-defined and communication-intensive, new tools take students outside of artificial classroom situations into conditions for authentic and high impact learning. Used in this way, new media technologies can be powerful in fostering engagement with others through dialogue, collaboration and exchange. What we saw in this regard goes beyond the positive role of social interaction and discussion that classroom teachers have long valued. New media tools and environments make possible socially situated learning in at least three new ways: First, they have the potential to create intellectual communities that all too rarely occur within and around classrooms. Second, they have the potential to connect students to communities of practice outside of the classroom where knowledge and ideas are continuously negotiated. And finally, the public nature of many new media pedagogies fundamentally changes the ways that students engage the full range of cognitive and emotional dimensions of their learning.

Considering these facets of socially situated learning, we felt the influence of Jean Lave and Etienne Wenger's theories of "situated learning," and especially their definition of participation "as a way of learning—of both absorbing and being absorbed in—the 'culture of practice.'"²¹ Although elaborated in their research on "apprenticeship" contexts outside of schooling situations, there is ample parallel work in educational settings, including the emerging movement around "threshold concepts," originating in the U.K. through the work of Jan Meyer and Ray Land. A threshold concept "can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress." More than just important or building block concepts, threshold concepts are the core ideas in a field that "represent how people 'think' in a particular discipline, or how they perceive, apprehend, or experience particular phenomena within that discipline (or more generally)."²² Threshold concepts are not merely about knowing something, but about the experience of knowing, and the experience of coming to know. They open up a way of looking at disciplinary knowledge that encompasses a way of thinking, a way of acting or practicing, a way of communicating, and in some cases a sense of identity.

The work on threshold concepts speaks directly to the findings of the Visible Knowledge Project. If adaptive pedagogies change the learners' relationship to the field of knowledge, and embodied pedagogies affect their sense of identification with it, then socially situated pedagogies bring both together through the learners' changed relationship to a sense of community within and beyond the classroom. Situating learners within broader communities of dialogue and practice can engage novice and intermediate learners with what is necessarily difficult in fields—what it means to think, act, speak in a field, to shape one's identity and sense of self within it. As Michael Wesch puts it in this issue, "We are no longer teaching subjects but subjectivities."²³

21 Jean Lave and Etienne Wenger, *Situated Learning: Legitimate Peripheral Participation* (Cambridge University Press, 1991).

22 Jan Meyer and Ray Land, "Threshold Concepts and Troublesome Knowledge: Linkages to Ways of Thinking and Practising Within the Disciplines," ETL Project Occasional Report 4 (May 2003), <http://www.ed.ac.uk/etl/docs/ETLreport4.pdf>.

23 Michael Wesch, "From Knowledgeable to Knowledge-able," *Academic Commons* (January 2009), <http://www.academic-commons.org/commons/essay/knowledgable-knowledge-able>.

The increasingly visible connection between identity and knowledge—this “learning to be”—is a critical bridge between embodied and socially situated learning. Nowhere is this more evident than in experiments with ePortfolios, allowing students to create representations of themselves as learners. LaGuardia Community College is an institution that has adopted ePortfolios broadly, with a student population that is 60 to 70 percent immigrant. In this context, for students who are redefining themselves as learners, the ability to use social tools as representations of identity is particularly trenchant. “The ePortfolio helps LaGuardia students make a direct and powerful connection between their classroom learning and the rest of their changing lives. And as is evidenced from [student testimonials] they place a high value on the ways that the Web-based format allows them to make their embodied learning public.” The ePortfolio enables students to represent themselves on several levels: to see themselves in the present in relation to the past (“Going back and looking at an assignment I did two years ago was difficult in some ways. But in the end . . . it was interesting to see I really did that”; “[It] helps me think about what I learned and what I did not do well on in the past. It also improves my critical thinking so I will not make the same mistake again.”); ePortfolios help students see themselves as whole learners beyond individual assignments (“I learned a lot . . . not just about the career but about myself”; “I was able to think about my experience and that helped me plan what I want to be”); ePortfolios help students present themselves outward to parents and others (“I can show [people], ‘This is what I have done...’ They can see everything. It’s me.”).²⁴ In so many ways, ePortfolios are the “cognitive and affective synthesis” gone public—but equally importantly, this is a sustained “going public” that circles back to energize the cognitive and affective synthesis. This cycle is critical to understanding the role of identity formation in new knowledge environments. Seen as a pathway to the heart of knowledge practice, socially situated learning encompasses all the dimensions of new learning environments and learning designs.

Design findings: Across the diverse projects in VKP we found that socially situated learning typically requires that multiple elements and values be present and reinforcing if they are to offer more than casual dialogue and communication. Some of the elements that must be present in combination include:

- An authentic task (drawn from approximations of expert activity), where students can feel a clear sense of purpose;
- The opportunity for students to develop a sense of voice and authority;
- The opportunity to develop a sense of community or audience (inside or outside the classroom);
- A meaningful social situation where feedback is intrinsic and embedded, coming from the situation, from sources other than the teacher.²⁵

Socially situated pedagogies are well suited to support these mutually reinforcing elements. And the operative presence of all of these elements helps each to become more meaningful. Socially situated learning at its most effective leads through engagement to commitment, where students, in small and large ways, come to experience what it means to inhabit their knowledge and the values it implies.

24 Bret Eynon, “It Helped Me See a New Me”: ePortfolio, Learning and Change at LaGuardia Community College,” *Academic Commons* (January 2009), <http://www.academiccommons.org/commons/essay/eportfolio-learning-and-change>.

25 This framework was initially developed and articulated by Randy Bass and Heidi Elmendorf. See “Defining Social Pedagogies and Their Relevance to Liberal Education,” (Web-based project working report, Teagle Foundation), <http://www.cfkeep.org/html/stitch.php?s=21958734860605&id=39912242945202>.

>Designing for socially situated learning means emphasizing the development of student voice and authority.

Although difficult to agree upon in exact definition, the concept of student voice loomed large in the VKP classroom inquiries. More often than not, this was accompanied by an emphasis on an emergent sense of authority that comes with intellectual growth. The social media environments of Web 2.0 make the recognition and cultivation of such authority increasingly important as the centerpiece concern of a learning environment. As with other key findings, our inquiries emphasize the need to rethink what we have traditionally meant by “authority” in the classroom, even when held by students. That is, we have to rethink traditional trajectories of accumulation of knowledge that builds to authority; instead we need to rethink authority as something that is socially constructed through the learning situation and that builds in non-linear ways, from a comfort with experiential and personal authority, to knowledge-based authority, to a sense of communal authority that integrates knowledge with experience.

In Heidi Elmendorf and John Ottenhoff’s parallel studies of online asynchronous discussion boards, they found that the emergence of conversational and interpretive authority depends on the integrative presence of freedom to play, safety to take intellectual risks, models of good talk to follow, and a space where venturing ideas and answers is valued as part of the rules of the game.²⁶ Just as Ed Gallagher found in his course designed entirely around online discussion, Elmendorf and Ottenhoff found that “the traits that characterize productive conversations” are identical to highly functioning communities of practice. All too often we devalue “conversation” as peripheral and yet teach (through asocial methods) to an implicit goal that looks remarkably like “conversation” in an expert community of practice. In order to use new media spaces for socially situated pedagogies, we have to value the development of student voice and emerging authority in all its developmental phases.

>Designing for socially situated learning requires cultivating intellectual community in and around the classroom.

At the end of her case study, which details a unique experiment in keeping a group of students connected over four years, Betsi Stephen remarks, “An authentic community of scholars is the embodiment of higher education . . .” Indeed, although most faculty value the abstract idea of the classroom as an intellectual community, it is difficult to achieve for many reasons. New media technologies and social tools are the new ubiquitous infrastructure for social networking and community building at all levels. What do we know so far that can help us harness that potential? First, we know that social spaces can only become communities if students have the opportunity (and space) to listen and respond to each other in ways that feel authentic. In Elmendorf’s study of online conversations in a microbiology course for non-science majors, she found a significant shift over the course of the semester from students “referring heavily to the text” to referring “more often to each other’s comments.” As she observes, “early in the term they talk mainly to the text and to us [the professors] through their postings,” but as the term progresses they start “inviting answers from their peers and respond to/amplify/dispute the postings of classmates.” Importantly, a marker of this richer conversation is as much the kinds of questions they are willing to ask of each other, as the answers or opinions

26 Heidi Elmendorf and John Ottenhoff, “The Importance of Conversation in Learning and the Value of Web-based Discussion Tools,” *Academic Commons* (January 2009), <http://www.academiccommons.org/commons/essay/importance-conversation-learning>.

they offer. This conversation works best when the “rules of the game” are actively modeled by the professor. In Elmendorf’s case, this included a weekly in-class reading and discussion of postings. Ottenhoff did a parallel study of the development of “interpretive authority” in a Shakespeare course. He found the development of an intellectual community required him to balance his students’ need for help “learn[ing] how to read and talk about Shakespeare’s plays” with their need for him to “get out of their way.”²⁷

The key here is not merely that socially situated pedagogies are sites of busy talk but that there is a relationship between conversation and knowledge building. For Gallagher, the very definition of intellectual community through conversation depended on evidence that learning was altered by the encounters. As he puts it, “Most students—not all, of course, and some haltingly, for sure—learned to talk to each other and in doing so talked to me in the language of community that I had longed to hear.” He then quotes one student’s reflection:

Normally, other students have very little to do with my own learning process....This is the only class I can think of that makes the other students a learning tool for the class. Listening to and understanding other student comments helped me better understand the books we were working on. Their insight helped me look at things differently.

The value of intellectual community extends beyond conversation. Students engaged in the multi-media authoring, video production, and digital stories typically developed a sense of intellectual community—initially among their peers as fellow shapers of public narratives, but then eventually (and perhaps more profoundly) with their potential audiences. This resonates on nearly every level of the authoring process, from the relatively predictable, such as choices of music or images to evoke audience response, to what Coventry and Oppermann call “argument compression,” students’ developing ability “to succinctly evoke ideas, eras, larger cultural discourses. . . .” Or, as one student creator put it, “digital stories require condensation and a very potent blast of powerful message.”²⁸

Teaching courses that engage students in video documentary production, Bernie Cook argues this kind of authoring generates not only a sense of ownership but two key values of documentary production: “collaboration and shareability.” In order to “expand this signature value of shareability,” says Cook, “I created opportunities for the students to screen and discuss their work,” screening films both in class and in public venues. “The shareability of documentary video enables an expansion of learning beyond the semester, outside of the traditional spaces and boundaries of teaching and learning.”²⁹ Such a statement could easily become the mantra for the whole set of socially situated pedagogies, explored in VKP and emerging with even greater force in Web 2.0 environments.

27 Stephen, “Connecting the Dots,” *Academic Commons* (January 2009), <http://www.academiccommons.org/commons/essay/connecting-dots>; Elmendorf and Ottenhoff, “The Importance of Conversation in Learning.”

28 See Coventry and Oppermann, “Digital Stories: “From Narrative to Database: Protocols and Practices of Multimedia Inquiry in a Cross-Classroom Scholarship of Teaching and Learning Study.”

29 Bernie Cook, “Producing Audiovisual Knowledge: Documentary Video Production and Student Learning in the American Studies Classroom.”

>Designing for socially situated pedagogies redefines classroom activity as “approximations” of expert activity.

The markers of intellectual community in these courses can be thought of in light of the distinction that the cognitive scientists Carl Bereiter and Marlena Scardamalia make between first-order and second-order environments. First-order environments are “the ordinary situations of work and everyday life . . . They present a relatively fixed set of conditions, and learning tapers off as one adapts to those conditions.” Second-order environments are a particular kind of social environment conducive to development of expertise. In this kind of expert sub-culture one “adapts to changes that keep raising the ante, by setting a higher standard of performance, by reformulating problems at more complex levels, or by increasing the amount of knowledge that is presupposed.” In second-order environments, in particular, “the conditions to which people must adapt change progressively as a result of the successes of other people in the environment.”³⁰ Too often, classrooms resemble first-order environments where students adapt to a fixed set of expectations, calibrated by (and represented by) the teacher. Socially situated pedagogies provide prototypes for the creation of second-order environments in classrooms, where students look to other students’ successes and innovations, and the class as a whole looks outside its boundaries to external audiences and parallel communities for progressive markers of learning and assessment.

Considered in this way, socially situated pedagogies provide what Pam Grossman named (in the context of teacher education) “approximations” of expert practice, where enough of the conditions of authentic practice are recreated to enable development along a path to expertise. Through VKP classroom case studies, we saw such “approximations” in all kinds of settings, inside the classroom and bridging outside to sites where knowledge is negotiated, understood, shared, and altered in participatory ways: the digital story student author wrestling with the problem of telling a story of a little known historical event to a naïve audience; the participants in an online discussion who must tool their discourse so as to keep the conversation going and not simply make their claim or state their opinion; the student creating an ePortfolio that manifests emerging competencies for a potential employer or transfer school; the students using a wiki to construct a complex definition of race who must learn how to make individual contributions in a participatory authoring environment. New digital social tools provide an arena for learners to approximate the kinds of knowledge negotiation and construction engaged in by practitioners in a field.

But herein lies a critical dimension of the design problem that is before us. Approximations may situate students in the context of authentic practice—such as how to tell a complex historical story to a public through multiple media, or how to keep a conversation going among peers in meaningful intellectual ways. However, it does not follow that we can expect to see what we normally think of as finished, expert-like products, meeting a traditional standard of critical analysis or knowledge representation. Part of the design challenge of socially-situated learning is trusting the value of putting students in higher order situations but shifting our notions of what kinds of learning evidence we might expect. In other words, we might be able to raise our expectations only if we change them.

As faculty, we tend to operate on an implicitly aligned set of beliefs in limited novice understanding, the narrow range of things we ask students to do in the context of received information and authority, and the kinds of work we assess as evidence of learning. Rethinking classrooms in the context of new social media and in turn more as second-order environments will shift these aligned assumptions. Our

30 Carl Bereiter and Marlene Scardamalia, 102; 106-07.

findings show the need to engage in what Grossman identifies as a critical analog, an approximation of practice: the ability of the teacher to “decompose” practice in ways that component parts can be named, studied, rehearsed, and improved.³¹ Many VKP projects shine light on some of the parts and processes that constitute an expansive range of learning, making it possible to “decompose” and build on them as parts of a much richer profile of intellectual growth.

In many ways, “decomposing” expert practice is what is going on when Ed Gallagher coaches his students’ “volleys and returns” in online conversations, as methods of knowledge creation. It is evident in the ways digital storytelling and social documentary video courses at CSU Monterey Bay and Georgetown—each in their distinctive ways—slowly build narrative through stages, as students watch the stories of previous years, engaging other students as authors putting theory to practice through production.

Understanding socially situated classroom pedagogies as approximations of expert practice introduces a level of uncertainty into the learning environment itself, as the teacher has to act more speculatively on the ways that students will respond and grow. Rethinking the classroom this way potentially challenges fundamental assumptions about intellectual growth in undergraduate courses in part because of the ways that socially-situated learning makes relevant connections (to people and ideas) outside the boundaries of the classroom. From a learning design standpoint, it suggests the importance of spiral or iterative design, where students are guided through large and challenging problems and, at the same time, guided through reflective activity focused on the critical dimensions of integrative thinking. The imperative might be framed this way: it is vital to help students understand specific and often highly localized intellectual “moves” intrinsic to expert activity; but this can only be accomplished in authentic, messy, and unpredictable contexts where such moves are truly meaningful.³² New social media can make those contexts and moves more visible and therefore usable in new and powerful ways.

Looking Back at the Future of Invisible Learning

When the invisible becomes visible it is often disruptive, sometimes in generative and productive ways. Very early in the Visible Knowledge Project we understood that we could not even begin to answer the question about the impact of *technology* on learning without knowing more about the impact of *teaching* on learning: the impact of our pedagogical designs on actual student growth and understanding. As faculty, in many ways we regard our impact on learning with a kind of “bounded rationality,” making relatively limited choices as a way of protecting ourselves from the complexity of the possibilities. In this context, new technologies and the scholarship of teaching and learning share a certain revelatory capacity. That is, new digital environments tend to unleash and make visible dimensions of student learning that exceed the bounds of our traditional schema in higher education, problematizing our traditional trajectories of development and challenging, if not confounding, our abilities to assess. Similarly, the scholarship of teaching and learning asks faculty to slow down and look at learning perhaps more carefully or more deeply than the pace and necessities of week-in and week-out teaching typically allow. When that happens, faculty often find student learning that is at least stubbornly resistant to our everyday assumptions about the relationship between exposure and

31 See for example, Pam Grossman, “Unpacking Practice,” lecture on YouTube, http://www.youtube.com/watch?v=K6s3mZQr_hU (accessed December 2008); and Lampert, et. al. The role of rehearsal in learning to do ambitious practice (presentation at AERA, 2008), http://sitemaker.umich.edu/ltp/files/aera08_rehearsals.pdf.

32 Graff, Gerald, and Cathy Birkenstein, *They Say / I Say: The Moves that Matter in Academic Writing* (New York: W.W. Norton, 2006)

understanding. VKP brought these two revelatory forces together. What this confluence of visibility suggests is that something generative and disruptive is possible (if not inevitable) if we take seriously the synergistic implications of adaptive, embodied and socially situated pedagogies.

The modest classroom research studies that came out of VKP corroborate the bigger claims being made by recent work on the brain and intelligence, as well as by the advocates for more holistic approaches to education. In *A Whole New Mind*, Daniel Pink lays out the qualities of mind suggested by the most current left- and right-brain research, what he calls the new six senses: Design, Story, Symphony (“synthesis”), Empathy, Play, and Meaning. These are all qualities remarkably resonant with the intimations of new learning revealed in VKP classroom research projects. These senses, says Pink, are the six that are most necessary to cultivate if we are to transition competitively from the “Information Age” to the “Conceptual Age,” an age calling for what he calls “creators and empathizers.” Similarly, Sir Ken Robinson, speaking in behalf of an increased role for creativity in education, critiques the entire set of assumptions behind our educational system that arose “to meet the needs of industrialism.” As Robinson put it, “We have mined our minds the way we have strip mined the earth, for one particular kind of academic commodity. And it won’t serve us any longer. What we need is a new human ecology that enables us to fundamentally change the ways that we educate our children.”³³

The findings and framework that emerge from VKP suggest in small ways what might lead us eventually to this new human ecology. What is perhaps most useful for the next phase of learning experiments is the recognition that the seeds of this revolutionary potential can found in what we value in our current practice. Michael Wesch, like Gregory Ulmer, sees this transition not as a break but as an “inversion”: Says Wesch, “We have had our *why’s*, *how’s*, and *what’s* upside-down, focusing too much on *what* should be learned, then *how*, and often forgetting the *why* altogether. In a world of nearly infinite information, we must first address *why*, facilitate *how*, and let the *what* generate naturally from there.”³⁴ The framework we have laid out here, organized around adaptive expertise, embodied learning, and socially situated learning, provides one way that we can re-imagine the “*why’s*, *how’s*, and *what’s*” in such a way that recenters teaching and learning around a holistic notion of expertise, pivoting on disciplinary practice yet expansive enough to engage all the “senses” embodied in experts’ commitment to their knowledge and values.

In this way, these VKP classroom inquiries collectively help us move past what is often portrayed as a binary between traditional, disciplinary knowledge and new forms of knowing. What the VKP studies illuminate is a less a binary than a paradox or tension that marks the path to the future: new forms of social media make possible a reformulation of education that is, we find, an intensification of the kinds of thinking held dear at the center of our disciplinary practices: higher order, synthetic, creative, and inquisitive approaches to thinking within fields of knowledge. Yet to realize this potential, we have to confront our biases about learning and intellectual growth. We have to re-examine our prioritization of particular kinds of knowledge—a prioritization historically embedded in the very epistemologies of our disciplines. The key to resolving this tension, our inquiries suggest, begins with parsing out of the intricacies of the “how” that are so pivotal to the ways disciplinary experts carry out the “what.”

33 Daniel Pink, *A Whole New Mind: Why Right-Brainers will Rule the World* (Riverhead, 2005); Sir Ken Robinson, “Do Schools Kill Creativity?” (TED Talk, February 2006), http://www.ted.com/index.php/talks/ken_robinson_says_schools_kill_creativity.html.

34 Michael Wesch, “From Knowledgeable to Knowledge-able.”

Implications for Next Stage of Faculty Inquiry

Disentangling the epistemology of our disciplines from our biases about intellectual development will not be easy. This makes the call to inquiry of the kind that we did in VKP—and that thousands of faculty are engaged in all over the world—all the more important. Set against the emergence of Web 2.0 tools, our experience from VKP also tells us something about the importance of sustained faculty inquiry in the sometimes breathless rush to incorporate the next new thing. First, it validates the importance of slowing down and taking the time to study carefully the nature of learning in new contexts, and trying to understand the “how” and “why” of changes in learning. Second, we have to recognize the messiness of looking at learning in these contexts. All teaching and learning contexts are complex; new digital and social environments for learning are especially so. The so-called Web 2.0 tools offer us a much richer, totalized environment for change, far beyond examining how the addition of a particular tool gets us to the same goal as before. Taken seriously in all its dimensions, digital media has the potential to enable us to enact the logic of a new learning paradigm, where teachers no longer primarily provide information but rather structure opportunities for students to construct their own learning.

The Visible Knowledge Project was not just a collection of individuals asking similar questions in parallel; it was a community of scholars engaged in a collaborative inquiry. Over the years, through in-person institutes and numerous virtual communication tools, faculty scholars in VKP engaged each other's questions, methods, and findings. The interactive and collaborative nature of the project was most valuable to each participant in managing the uncertainty and destabilization that came from looking so closely at learning in new contexts. What this suggests to us is that, along with this new paradigm for learning we need perhaps a *new paradigm for inquiry*, for sharing knowledge about teaching and learning. We need, in short, to begin adapting the kinds of social tools and knowledge-making environments for building knowledge as a community that we seek to integrate into our teaching. Such inquiry would certainly move beyond individualistic paradigms of practice and scholarship to something not only more collaborative but indeed “participatory” in the new embodied sense of the term in Web 2.0 environments. For example, consider the definition of participatory learning in the 2008 MacArthur Foundation Digital Media and Learning grants call for proposals:

*Participatory Learning includes the ways in which new technologies enable learners (of any age) to contribute in diverse ways to individual and shared learning goals. Through games, wikis, blogs, virtual environments, social network sites, cell phones, mobile devices, and other digital platforms, learners can participate in virtual communities where they share ideas, comment upon one another's projects, and plan, design, advance, implement, or simply discuss their goals and ideas together. Participatory learners come together to aggregate their ideas and experiences in a way that makes the whole ultimately greater than the sum of the parts.*³⁵

Could we imagine a community of scholars—a small circle or a large-scale network—engaged in a participatory learning project around core curricular issues or ways to teach dimensions of a discipline? Could we imagine an inquiry process that was fluid and collaborative in such a way that enabled ongoing understanding of what is indeed happening in new spaces along all dimensions of learning?

35 2008 MacArthur Foundation Digital Media and Learning grants Web site, call for proposals, <http://www.dmlcompetition.net/theme.php>

Surely the scale of the disruption is such that careful classroom research projects will only get us so far. Such fluid and collaborative inquiry might need students and teachers, practitioners, and partners, and bystanders of all kinds to make sense of new learning while socially networked tools aggregate, sort and re-present pieces of new insights in unpredictable ways. Could we imagine the blend of such a participatory process with the creation of a true intellectual community—a second-order environment—to harness the visible evidence of invisible learning? Slowing down, listening, and making visible what we learn from each stage of development is an essential first step. What is the essential next one?