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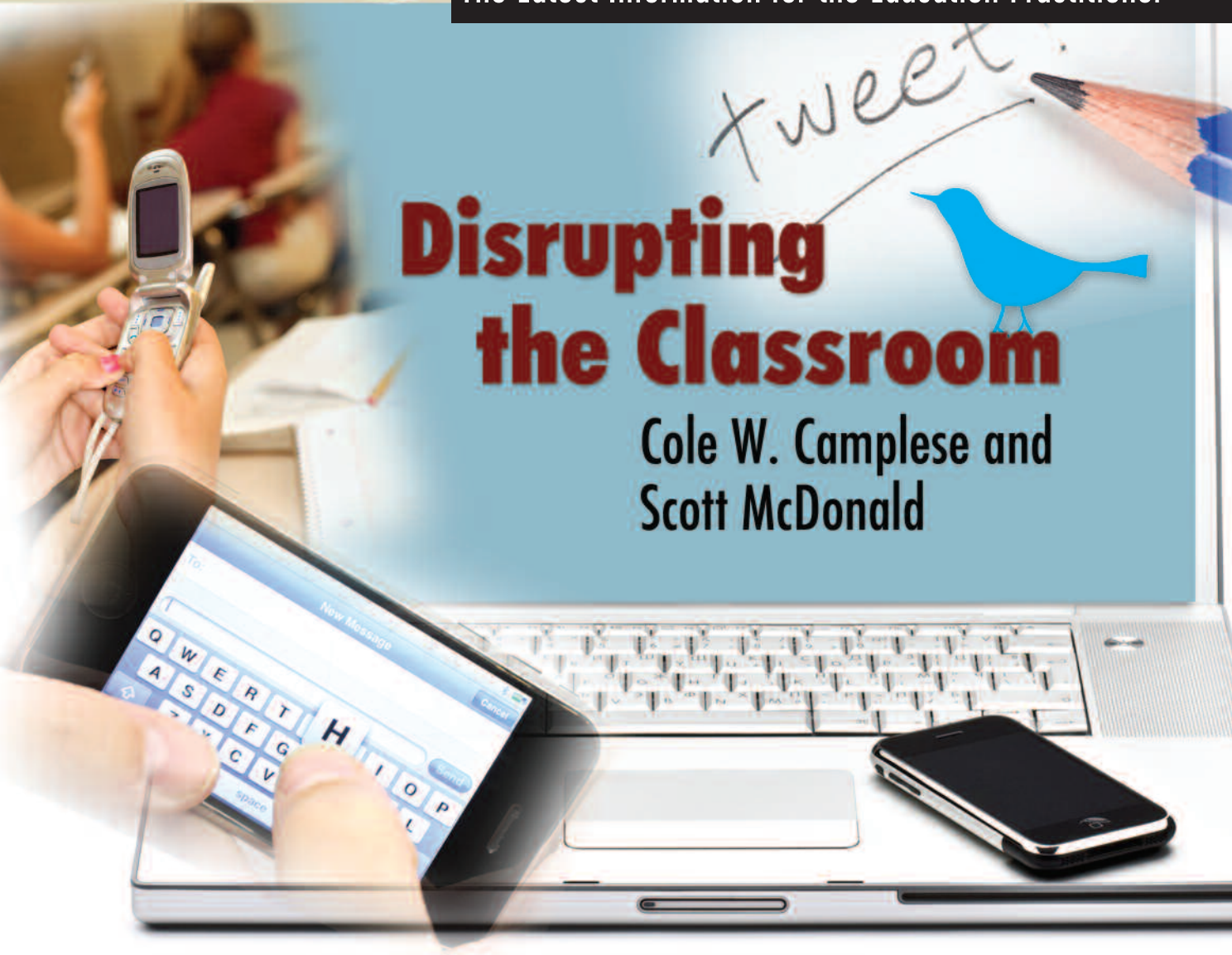
Disrupting the Classroom

Cole W. Camplese and
Scott McDonald

Executive Summary

AUTHORS COLE W. CAMPLESE AND SCOTT MCDONALD developed and co-taught a graduate course in Penn State University's College of Education called "Disruptive Technologies in Teaching and Learning." The course combined the rigor of graduate-level instruction in theoretical, pedagogical concepts with practical guidance in the application of technology to teaching and learning contexts. The class focused not on technologies but on the pedagogical possibilities of disruptive technologies and how to design learning opportunities around these technologies.

The authors argue that disruption can be viewed as a positive and important aspect of teaching. Rather than deriding new technologies as distracting for their students, they suggest that future educators should embrace technological disruption as part of a natural social evolution in the way people learn. Central to the notion of disruption is Web 2.0 and its associated evolving social technologies. These tools are transforming the way we think about ourselves, our communication with others, our forms of education, and even our knowledge and expertise.

During the graduate course, the authors saw students engaged in rigorous conversations about the core tenets of the class, both online and offline, at all hours of the day and throughout the week. The students coalesced into a learning community, in large part because of their work to understand how the social environments function and how to best engage one another in these spaces. In-class inter-action reinforced much of this sense of community, but the surprisingly extensive use of the online spaces led the authors to ask new questions about how to blend technologies into a more productive learning space. Tools at first treated as disruptive (laptops, Internet connections, online social environments) were used by students to ask questions, provide resources, gain confidence, and interact in ways that shattered the authors' previously established ideas about how a class should work.

The authors have come to see is that disruption does exist, and it can be utilized to help create new learning environments in which students are ultimately more engaged and effective. This article explores what the authors consider to be core themes challenging the traditional view of technology's impact on teaching and learning.

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IN THE SPRING OF 2008, we developed and co-taught a graduate course in Penn State University's College of Education called "Disruptive Technologies in Teaching and Learning." The course was a grand experiment, combining the rigor of graduate-level instruction in theoretical, pedagogical concepts with practical guidance in the application of technology to teaching and learning contexts. We felt most educational technology courses lean too heavily on the technology and its applications and do not address educational theory. In contrast, educational research and design courses often have a heavy reliance on theoretical concepts but fail to take into account the problems of practical technology issues. We wanted our students to understand the impact that technology can have on a classroom environment, and we hoped that by the end of the semester they would feel confident and excited about using technology in their own teaching. We didn't teach technologies; we spent time discussing the pedagogical possibilities of disruptive technologies and designing learning opportunities around these technologies. We were surprised and amazed by the results of our experiment. The experience has caused us to reconsider not only our course design, but our approach to technology and the ways we address technology use within teaching and learning.

We both spend a great deal of our time thinking about how technology can be used to support teaching and learning. Scott McDonald is a teacher educator and educational researcher at Penn State whose work examines technology's impact on teaching and learning in both K-12 and higher education. His passion for the improvement of teaching

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methods gave our course its emphasis on the theoretical constructs of community, identity, and design. This trinity of concepts comes from research on communities of practice by Etienne Wenger (1998). Cole W. Camplese is the director of Penn State's educational technology services group, in which capacity he devotes himself to understanding technological trends and making critical decisions that impact the 94,000 students. His investigation of emerging technologies ensured that students in the class would have the background that would enable them to understand the potential pedagogical utility embedded within the technologies we investigate. Our combined expertise in teaching practice and the use and evaluation of technology allowed us to create an unparalleled course.

We are proud to call our course "disruptive." We want to convince others that disruption can be viewed as a positive and important aspect of teaching. Rather than deriding new technologies as distracting for their students, we want future educators to embrace technological disruption as part of a natural social evolution in the way people learn. Additionally, we wanted to build upon Christensen's sociological work (Christensen, Horn & Johnson, 2008), which labels as disruptive those innovations or technologies that significantly alter current patterns of social functioning. Central to our notion of disruptive in the current social environment is Web 2.0 and its associated evolving social technologies. These tools are transforming the way we think about ourselves, our communication with others, our forms of education, and even our knowledge and expertise. Viewing social technologies as disruptive is central to the overall design of our course and our ongoing investigations into integration of disruptive technologies into our teaching.

Social Media and Education

Our social landscape is changing radically—and quickly. Online social spaces continue to evolve and gain acceptance and we are sharing information and constructing knowledge in ways that were im-

possible until now. Lankshear and Knobel (2007) study the people who use Web 2.0 tools and describe the ways they interact through and in this new media space. Specifically, they mention that users believe that knowledge is a community artifact created through a shared space and editable by everyone. Wikipedia is the seminal example of this type of knowledge generation. We also recognize these new tools have led to a more extreme fractionalization of identity. Most would admit to being a "different person" at home, at work, with friends, or at a cocktail party among strangers. This process has been accelerated by that fact that people now have user IDs in multiple technological environments that provide different types of interactions with different communities of people. Aggregation spaces, like Facebook, combine elements of different technologies. Status updates, pictures, video, large sections of text about user's interests, and a host of other representations of identity all exist in one environment. All of this is then public. Our identities were once based simply on our presentation of ourselves in real time to real people. With the rise of multiple online identities, users must now be cognizant of the notion of a meta identity that is shaped by the publicly available aggregate of these online social environments.

So, what does the emergence of social media mean for education and the people who design educational experiences? Well, the short version is that schools will have to change to accomodate these new types of technology, but that is an idea as old as the blackboard. We cannot assume that new technologies are really going to change things, as there is no evidence that technologies have made significant changes to our educational systems in the past. In spite of blackboards, overhead projectors, film strip projectors, TVs, and PowerPoint presentations, teaching is much the same as it was a hundred years ago.

One difference with Web 2.0, however, is that it is explicitly social and deals with interactions (often dialogic) between people. Dialogic interac-

About the Authors

COLE W. CAMPLESE serves as the director of Education Technology Services at The Pennsylvania State University. His primary area of focus is the integration of emerging technologies into learning spaces. He oversees the annual Teaching and Learning with Technology Symposium, several community development events, and other initiatives designed to support the adoption of technology for teaching and learning.

He is an Apple Distinguished Educator, selected for his innovative uses of technology in and out of the classroom. Camplese has served on several industry and higher education advisory boards. He is an established consultant and a published author and has presented both practical and theoretical concepts at regional and national conferences.

Camplese received a master's degree in instructional technology from Bloomsburg University and a bachelor's degree in psychology from West Virginia University.

SCOTT MCDONALD is an assistant professor of science education at The Pennsylvania State University. He is also the director of the Innovation Studio in the PSU College of Education, an initiative to develop digital pedagogies in higher education. He received his Ph.D. in learning technologies from the University of Michigan. His research focuses on multi-channel, technology-supported discourse in face-to-face classrooms. He also researches the development of professional pedagogical vision in preservice science teachers through digital video analysis. His work is funded by the Knowles Science Teaching Foundation Early Career Research Fellowship.

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tions are the central activity in quality teaching. Past technologies supported the dominant paradigm, which is the metaphor of teaching as transmission. Another common model (which has been well supported by the infusion of computers into classrooms) is the "individual learning at his or her own pace" model. The primary goal in such an approach is to support individual learners with drills and practice or to have small teams work on goal-based scenarios. In these typical approaches to using computers in classrooms, there is no real change in the underlying way we think about teaching and learning. The "new" metaphor is that the classroom is a community. Of course, this is not really new, but the classroom community is usually just a relabeling of what was already there. It is rare for teachers to create classrooms in which students exchange ideas to build toward a shared understanding of a conceptually complex phenomenon. Students are placed in groups, often by abilities, and do not communicate with other groups as part of a natural process of doing their work. The class has no sense of a shared mission or goals. Students work for themselves (and to achieve their grades) and the community is more focused on affective support rather than related to the core work of what students do: learning something about content.

Web 2.0 tools can be used to address this problem. They are specifically designed to support communities in completing shared tasks. Wikipedia survives on a small number of paid employees because the contributors have a shared sense of mission. Educators need to build a similar sense of shared purpose, but not in superficial ways, like by holding pep rallys, and not in non-academic or affective ways, like cheering for sports teams or holding "respecting our differences" types of campaigns. Schools and universities have the potential to become communities of learning, but educators and administrators must rethink teaching and learning in the context of new social trends and the technologies that support them.

When we taught our disruptive technologies graduate course, we saw students engaged in rigor-

ous conversations about the core tenets of the class, both online and offline, at all hours of the day and throughout the week. We watched students coalesce into a learning community, in large part because of their work to understand how the social environments function and how to best engage one another in these spaces. In-class, face-to-face interaction obviously reinforced much of this shared sense of community, but the surprisingly extensive use of the online spaces has led us to ask new questions about how to blend technologies into a more productive learning space. Tools at first treated as disruptive (laptops, Internet connections, online social environments) were used by our students to ask questions, provide resources, gain confidence, and simply interact in ways that shattered our previously established ideas about how a class should work. What we have come to see is that disruption does indeed exist, and it can be utilized to help create new learning environments in which students are ultimately more engaged and effective.

The remainder of this article will explore what we consider to be core themes challenging the traditional view of technology's impact on teaching and learning. We will explore these themes as they relate to how we incorporated them into the course design or how we plan to include them in the next iteration of the course. The particular technologies we discuss here are unimportant—what matters are the social trends these technologies represent. We want to challenge the future educators in our course to see the embedded opportunities provided by technology. We will specifically look at four trends, two that we took into the course as foundational elements of our design (identified), and two that emerged as the course progressed (emergent). The first two were concepts that we knew we had to exploit if we were to capture the imagination and apply the current technology practices of our students. The final two emerged as unintended but powerful outcomes of the course itself. All four build toward what we feel is a more connected and engaged learning community and will form the foundation of our course in the future.

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Identified Trend 1: Shift from Media Consumer to Producer

The Internet was originally envisioned as a collaborative environment, but only now has it finally fulfilled its original promise. The rise of the web as a platform for discourse and collaboration has finally reached a critical mass, as even the most casual users of the Internet are engaged in some form of participatory culture online. The read/write aspect of the Web 2.0 space has challenged the notions of producers and consumers to the point where nearly all people online can claim to be both. This is changing how news gets reported, how we consume goods, how we connect with others and maintain friendships, and how we participate in nearly all forms of entertainment.

It is important to clarify what we mean by digital producer of content. In our view, creating any sort of content and contributing online is a form of digital production. In this way our definition includes not only images, audio, and video, but text that is created in a blog space as a comment or even as a review at shopping site. To see the new landscape that has emerged online as a place where students are very active as content producers is critical to our overall view of how the web has worked to transform behaviors across the social landscape.

As the web has matured, the ability and desire to instantly publish content has increased dramatically. In fact, the 2009 Penn State Faculty Advisory Committee on Academic Computing Student Survey shows that 68 percent of Penn State students share photos on Facebook and 16 percent upload videos to YouTube. This is a shift from years past, when students simply used the web to access existing information. There are several reasons this shift is occurring, but the affordability of digital media production tools and relative ease of production are two central drivers.

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If you walk into most high school or college students' bedrooms, dorm rooms, or apartments, you may be overcome by the amount of gear and gadgets that are present. If you look at the media production ecosystem, the core tools now cost a fraction of what they did only two years ago. The emergence of high-definition, handheld video cameras for under $200, higher megapixel cameras built into cell phones, and mobile audio recording devices have made a huge impact on students' ability to acquire equipment that was once too expensive and out of reach. This equipment empowers them to be creative and produce content.

What was once the domain of the digital media production specialist has now become an on-the-go activity. College students can literally capture, edit, and post videos from their cellphones to the web while they walk across campus. With the emergence of YouTube, anyone can create both original media pieces and engage in remix activities that are easily shared with a global audience in a few clicks. The ideas of creating content and sharing it online are built around the notion of social connections. YouTube is in every way a social network filled with opportunities to share, discover, comment, and connect with real people who are also creating digital content. This ease of creation, posting, and connecting is creating a new set of challenges and opportunities to consider going forward.

In our first iteration of the course, we wanted to take advantage of this trend toward digital production by asking our students to create digital artifacts as part of the ongoing course dialogue. We asked each of our students to take advantage of the Blogs at Penn State, an open blogging platform for the Penn State community, as a place for them to post digital responses to the various course readings and discussions. We felt strongly at the time that these postings should be created in students' own spaces and then aggregated into one overall course space to support extended conversations. These digital contributions were used to frame the weekly discussions we had related to the learning goals for the week. What emerged was a strong feeling of owner-

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ship of postings by the class and a very powerful online community that attracted participants from outside the course. By the middle of the semester, our analytics showed that we were getting more than 1,000 unique visits a week from all over the globe. This reinforced our discussions of community and provided us with a preview related to the emergence of the power of the collective voice.

In K-12 schools we have to reconsider the purpose of the computers in the classrooms. Currently, much of the focus is on using the computers to access resources outside the classroom, of which there are an astonishing amount. Computers are also used for creating documents or artifacts with a local purpose: PowerPoint presentations describing a topic students have researched on the internet, word-processed lab reports or papers, and spreadsheets for doing calculations. Students also use computers to play skill-building games. However, these uses miss the mark when it comes to the emerging collaborative producer culture of Web 2.0. We have to develop assignments for our students that push them to produce digital artifacts designed to speak to a larger audience. It will give them a more authentic community in which to share their ideas and a way to start a dialogue outside their local classroom. Instead of creating a PowerPoint presentation, have students find a topic on Wikipedia and make a contribution to the online entry. Have them seek out a blog about the topic they are researching and make a post. Get them out there producing content in a space where they can get feedback from a real audience, not just from their peers and their teacher.

Challenges

The amazing growth in materials online has created new challenges to consider. The need for strong digital literacy skills, and specifically the ability to discern between accurate and inaccurate sources of information, has become one of the greatest challenges associated with the new web. Taking time to discuss how to evaluate content online with students at all levels is critical since this is a skill that must be taught and reinforced.

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Additionally, there are new things to consider within the frameworks of teaching and learning that have been impacted by the rise of online content production. How does a teacher or professor assess the level of engagement with course content when students are creating both text and rich media productions to share their points of view? The evaluation of these objects is both time consuming and complex. Rethinking what does and does not count as real evidence of learning becomes a much more sophisticated task as students continue to push the boundaries associated with the creation of knowledge artifacts. This is compounded by the fact that students can participate in a variety of spaces that are not easy to assess, such as Twitter posts, Facebook status updates, etc.

With the use of the open web on the rise in education, we are moving towards a much more disaggregated environment for higher education faculty. Over the last 10 years in colleges and universities, there has been an almost unhealthy reliance on the learning management system (LMS). These environments pull content, roster management, assessment, and other classroom functions into one package. It is a top-down, faculty-driven approach to the use of the web. But as more students become producers, there are more spaces for faculty to deal with. A digital video may be too large to submit to a LMS dropbox, but the same video published openly at YouTube is no larger than the URL that links to it. This creates problems for faculty that the LMS solved 10 years ago. Class work is no longer as easy as a Word document dropped into a defined dropbox. Faculty now have to travel the open web to read students' blog posts, watch their videos, and comment on conversations happening in multiple locations. Students' use of these spaces has created a challenge that will need to be solved with some relatively new thinking in the overall LMS environment.

The challenge for K-12 schools is the ever-present issue of student safety. The Internet, like every other community, has people with whom we don't want our students to come into contact. However, just like in any other community, we do students a disservice if we think that isolating them will keep them safe. We need to help them become smart members of the digital community, not just by teaching them to know if sources are legitimate and trustworthy, but also by teaching them how to appropriately interact with other members of the community. We teach our students not to get into cars with strangers, and it is just as important for us to teach them to navigate the digital dangers they will encounter in life outside the classroom.

IDENTIFIED TREND 2:
The Emergence of the Real Time and One Button Web

Our first theme described the shift from content consumer to content producer. Embedded in the shift toward production is a second emergent trend, one button publishing and the real time web. We are not just producing more, but the ways in which we are sharing our productions is changing. Prior to the emergence of Facebook and other modern web publishing platforms, sharing content online was a relatively tedious task often requiring multiple steps. In addition, once the material was posted, getting it noticed was the job of a search engine. With the emergence of social platforms, embedded networks of people can instantly see and react to content that is posted. This combination of one button posting and real time notifications sent to a personal community has created a motivational content sharing ecosystem that is both richly dynamic and addictive.

One Button Web
To share content in a social space or a personal blog environment, little is required but a single press of a browser button. In most cases, online publishing platforms provide "quick post" bookmarklets that streamline content sharing into a single click of a button. When dragged to the bookmark bar of any standard web browser, these bookmarklets enable instant sharing into a given platform. The simplicity

of one button publishing is challenging the way many of us think about collecting and sharing content from across the web.

To get content online a few years ago, students would have to navigate a complicated and technical path towards publishing. They wouldn't actually start with the content itself. Instead, they would start with HTML or a WYSIWYG web editor (like Dreamweaver) to construct an HTML document. This document was then published to the web using an FTP client that would transfer the document into a specific directory on the Internet. Once uploaded to a server, you could browse to that location, and if everything worked perfectly, you could see the content you had created. This process was a massive barrier to publishing online because the webpage production process was more complex than the original content deserved.

This led many people in education down one of two paths. The first is that the teacher would teach the web development process before asking students to put content online. The second and more typical approach was to skip using the web as a production space and simply ask students to create their content in local form. Using the one button publishing method that is provided with nearly all hosted blogging platforms creates new opportunities to gather and annotate resources that are instantly shareable, structured, and searchable. When you include the ability for these digital artifacts to be commented on and re-posted with new commentary, it is easy to see how the model creates living personal repositories of ideas through the management of digital materials.

The Real Time Web

In many ways the ability to publish content with a single click is driving new forms of conversations within social environments. Typcially one button publishing happens in a social network, where there are people waiting to consume and comment upon your posting. Even when content is published into a personal blog space, the blog itself can send out a Twitter posting or Facebook update with a URL pointing members of that community back to the original item.

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This real time posting and sharing of information provides the world and more selected audiences from within the social network with an instantaneous opportunity to comment on the posted content.

The idea that anything I post is instantly available to anyone who I am friends with in Facebook, follows me on Twitter, subscribes to my blog's RSS feed, or does a Google search is a staggering opportunity to engage. These postings become the fuel for larger conversations that come in the form of re-tweets, comments, or re-postings. When this occurs, students are almost instantly motivated to post more content into these spaces, and this creates a real time dialogue around ideas.

The real time web also affords new kinds of information consumption and participation. If you visit the Twitter homepage (http://twitter.com), one of the first things you notice is both a search engine and a list of current popular topics. The important thing to understand is that Twitter is built on top of millions of users posting about things that are happening in the moment all around them. This determines the type of content that is instantly discoverable there. Iranian elections from 2009 or the landing of the plane in Hudson River are both stories that were instantly recognizable as being told through Twitter and the real time web. Because Twitter has millions of people talking about what is happening in front of them in the moment, trends and emerging topics bubble up to be identified. When we use Twitter to search, we are essentially looking into the very near future. Quite a bit of the content discovered in the trending topics of Twitter will be part of the headlines we will all read in tomorrow's newspapers.

While Twitter emerged as a powerful tool to support real time conversations in our course, we did not plan for that to be the case. What we did want to illustrate was the ease with which modern web publishing platforms can remove barriers to posting content online. With this in mind, we asked students to find relevant content and collect it quickly with tools designed with one button publishing. Delicious, the social bookmarking site, is a prime exam-

ple of simple one button publishing. Students decided collectively on a shared tag for course content and installed the Delicious bookmarklet to quickly and easily publish relevant content into a shared repository. This gave students insight into the power of instant publishing and provided strong evidence that online publishing should be a part of standard workflow. The ability for us to instantly see these resources allowed new conversations to emerge, either face-to-face through our discussions or online via comments and repostings.

The strength of simple digital publishing and immediate access to a community can also impact the way we think about other aspects of student collaboration. Using a Google Docs spreadsheet, students can input data in real time as they are collecting it during a science lab. The teacher can project the spreadsheet so it can be seen by the whole class. This allows students to receive feedback on their data in real time. All the data appears as students enter it. If they see that their data is different from all the other groups, they can reassess what they are doing in the moment rather than after they have wasted significant time. Also, the class then has a shared data set to use for understanding the experiment and writing lab reports, and the students can access it from home. This is a simple application of an emerging technology that has powerful implications for the way students learn and understand science in schools.

Challenges

The way we view technology tools in education is built on an aging idea of the Internet publishing process. Even our more advanced learning management systems like Blackboard require us to log in and navigate clumsy interfaces every time we want to share content. Our students' expectations, however, revolve around one-button publishing, not the construction/browse/upload pattern that educational institutions are still using. If we expect to see students contributing within our learning environment in the same ways they do in their everyday lives, we need to radically rethink our tools and systems. The les-

sons we learn in our social environment need to be realized within our technology decisions.

The emergence of the real time web has changed the rate of content creation and acquisition and has altered how quickly conversations emerge online. We can no longer expect to capture the imaginations of our students through the outmoded storing of content semester after semester. Finding new ways to connect to fresh content will be a critical next step in the utilization of the web for teaching and learning. The ability to publish, view, and react to content has become an everyday and real time occurrence, and the model needs to find a home within our classrooms.

One thing that has to be considered at the institutional level with regard to real time and one button web is student access and control. In most K-12 schools this is significantly constrained. Students rarely have access to e-mail or other channels of digital communication through the school's network. There are obviously real and compelling reasons for this; however, if schools cannot find a way to balance this need for control with a more nuanced view of student access, powerful learning opportunities will be lost. The schools that solve this problem and reduce the barriers to outside interactions in safe ways will be ahead of the curve in student learning and performance.

Emergent Trend 1: Multi-Channel Discourse

Talk to a colleague about his or her view of students and you are likely to hear a description of constantly divided attention that works against students' ability to engage in a single activity for any substantive amount of time. There is a feeling that "kids today" are distractible (negative version) or multitaskers (positive version). Recent research indicates that this distractablilty might actually be a useful biological function that has helped keep us alive. Either way, it is common for people at a computer to have multiple windows open at the same time, including e-mail, chat, word processing, the web (for Twitter), music, and perhaps even video. Instead of seeing this as an issue of distractibility, we can rethink it as access to multiple channels of communication that can be leveraged to support the learning community. We are not saying we want teachers to embrace ubiquitous social networks simply because students are present in them. We are suggesting that the affordances of these environments and devices should be used to support the underlying principles in our own classroom practice.

When we walk into many of our technology-assisted classrooms, we instantly see problems. We see large machines sitting on desks in rows that students tend to hide behind. We know they are logged in and we almost always feel they are doing other things. It nearly always feels like a challenge, and the easy way out is to tell them to close the lids or to log out. But in our experience, there are real ways supported with emergent tools that can extend the conversation in a classroom both over time and to include more people from the outside.

In our course students had their "lids up" all the time. Undoubtedly they were not always on-task during class. However, we have evidence that they were on-task in ways that can only happen when we allow ourselves to let them keep their lids up and see it as a channel for contribution. In our case we saw students using Twitter to "pass notes" to each other during class. There were notes about where to meet after class (of course), but there were also notes about where a clear definition of communities of practice might be found in the text from last night's reading. They asked questions to each other as a way to preview them before actually voicing them in class. They also posted resources like webpages, videos, and other relevant digital artifacts. In many cases students used the parallel channel of communication to encourage each other to make bolder statements or even to press us as faculty to either review or accelerate. These new forms of conversations emerged without our encouragement and continued to surprise us even after the course concluded.

This was not our plan, either for what would happen with lids up or for how students might use Twitter. It emerged as a practice in class because students were allowed to create a form of interaction (computer mediated, multiple channel) that worked for them and supported their learning. In a very real sense, this was differentiated instruction. It created a sense that we were a learning community, interconnected on a variety of levels and through multiple modes. The question is how to maximize constructive use of the multiple-channel, computer-mediated dialogue. Our preliminary answer is to make the class/discussion engaging, not in the sense we typically think of this (fun), but challenging and thought-provoking. When students are asked to think hard about something and talk with their peers about it, they become engaged because they are trying to understand or convince others, not because the activity itself is fun. More people participate because there are more ways to participate and the participation is more meaningful for participants and their community.

Challenges

What confounded us once we noticed how rich this backchannel conversation was becoming was how we would measure contribution. With the students working very hard to contribute in the traditional channel (verbal discourse), we were forced to rethink what it meant to tweet during a class discussion. How do these contributions get assessed and what value does a teacher place on 140-character posts that are happening during the traditional classroom discourse?

While we don't yet have a complete solution to the multiple-channel assessment issue, we have moved toward construing participation in a much broader way. Students need not participate in the face-to-face conversation in class to be considered participants. We also look to their blogs posts, comments, Twitter posts, and wiki and Google Docs contributions as a way to understand their intellectual contribution to the group knowledge building activities. Ultimately, we are interested in how they

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are a vibrant member of our intellectual community, not the form that their contribution takes. In the future we may ask the students to make an argument for their own grade in terms of participation by collecting examples of how they contributed over the semester in various ways. Asking them to include a discussion of their participation in their final course blog post would be a logical next step.

Emergent Trend 2: Social Construction of Knowlege

For decades, learning scientists have understood that learning is inherently a social process. No matter what view of learning you have, you understand that learning with others provides tremendous opportunities to grapple with new ideas and make your own understandings about the world more grounded and well thought out. The social and technological changes we discussed in the first two trends have made it possible for this social construction of knowledge to become more public and accessible. Students are in the habit of sharing their thoughts with their community in a variety of digital forms. We can take advantage of that emerging pattern of practice by asking them to focus some of their sharing on the ideas we are trying to help them learn. By sharing and commenting, organizing and rearranging ideas, students are learning. New digital tools allow us to not only watch this happen in real time, but also to have a record of this knowledge construction in digital form. It is searchable and portable. This creates an amazing new window into our students' learning. It allows us to do formative assessment in ways that are much less cumbersome or ephemeral. We ask students to keep learning journals or fill out exit slips (cumbersome) or engage students in conceptual conversations about key ideas (ephemeral). Technology allows us unparalleled access to the way our students are thinking and the way they are building on their classmates' ideas.

Perhaps as a result of this new pattern of social practice, students increasingly see expertise as

something that is distributed and community-created and owned (Lankshear & Knobel, 2007). The epitome of this notion is Wikipedia, where all text is created, edited, and monitored by the community. However, the notion of expertise, or where knowledge resides, is changing everywhere the social web touches. Viral video, reviews on product websites, Twitter posts being used as primary source documents by reporters—all of these represent a new way of thinking about what it means to know and be an expert. The idea that knowledge is something that a community can build together is another form of the social construction of knowledge and has powerful implications for teaching and learning. We need to rethink assessments and activities in classrooms to reflect the idea that groups, not individuals, produce knowledge. We have always had group projects, but now we can have group projects that have the process embedded directly into them. Using Google Docs, we can see who contributed and even when they contributed to the final product. We can also see a running commentary in a parallel discussion tab that shows how the group made decisions to include or exclude content. All of this takes advantage of the fact that students now see ideas as something to be shared, debated, created, and modified by a community.

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Wiki-type tools, like Google Docs, were a central part of how our course operated. One of the students' projects used a wiki to develop a shared space for all members of the class to contribute and edit a set of class notes. Not only did this idea create a record of the intellectual work of our community, it also allowed us to look at who contributed to the document and what the nature of their contribution was. We could track back through versions to view how concepts were initially defined and what citations were used. This allowed us a sense of the development over time of our students' ideas and gave us access to a trajectory of their growth over time represented in the way that they edited a single, shared text document.

One unexpected pedagogical use of Google Docs
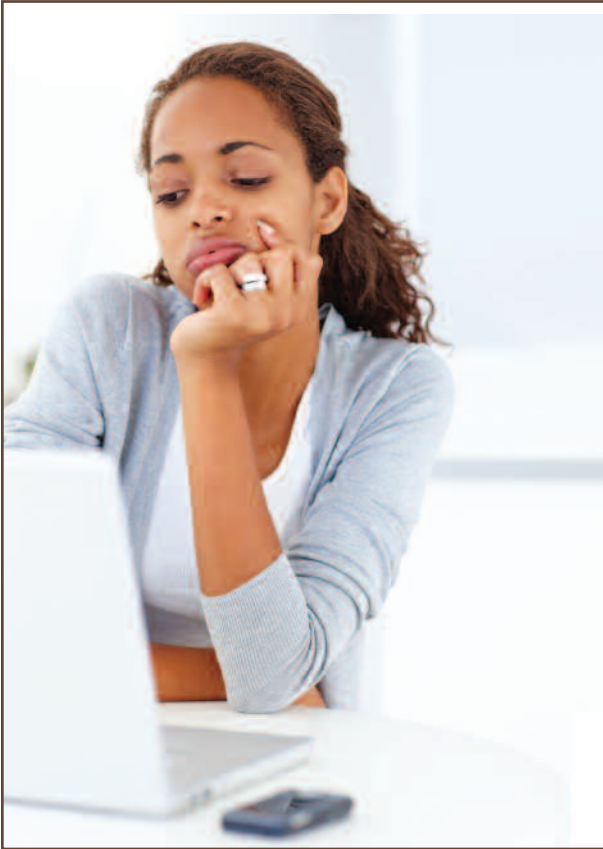
The truth of technology's power to transform society is the nature of what it means for it to be disruptive.

that developed was related to our ability to monitor students working in small groups. By asking our students to share a document with us and then opening those documents in different tabs in a browser window, we were able to flip easily from one group's work to another and watch as it developed. This afforded us the opportunity to add comments, suggestions, or even admonitions to get back on task directly into their documents. We could interact with all the groups without moving from group to group and without them even being in the same room or building.

Challenges

As with multi-channel discourse, one of the main challenges around the public social construction of knowledge is the tremendous amount of information this gives educators access to about their students. While this has powerful possibilities, it also poses significant challenges. If you are a high school teacher with five classes of 30 students each, you are likely already inundated by papers to grade. Receiving more products from your students is not likely something that sounds like it solves a problem. The question is how to develop new ways of thinking about assessment that encourage students to use the content they produce to create projects of a manageable size that can be assessed. A portfolio system using an open digital publishing platform could be used, in which students have to present an argument for their understanding based on a variety of digital artifacts collected during the class. Part of their class grade becomes the peer evaluation of other class members' portfolios. Whatever the solution, we will have to rethink assessment of students' knowledge to reflect emerging technologies and how they have remade the social construction of knowledge.

Next Steps

As we prepare to embark on another semester of teaching our course, we plan to not only build on the four themes outlined here but to expand our design further, challenging our students to consider both

the theoretical constructs of learning design and the embedded pedagogies within emerging technologies. We plan to find new ways to open the course in a greater sense than it was in the past by taking advantage of a more mature online social landscape. Ultimately our plan is to create a digital intellectual community whose goal is to draw on learning from past members of the course, as well as contributors from outside the traditional boundaries of the course.

We have taken steps to alter one of the original fundamental design issues. There is a single blog (http://blogs.tlt.psu.edu/courses/disruptive/) where all of our students' posts and comments will exist. It will be open to contribution from all (feel free to come by and stay a while!) so that we may build on the shared repositories we have established, and we will work to expand them over time. All of the work from our students during the last class has been added to this new blog as an intellectual history of work done so far, and we will invite our new group of students to participate. In this sense we will not start fresh, but the class will be included into an existing thread of discussion that will continue forward into the digital future.

We both spend a great deal of our time thinking about how technology interacts with teaching and learning. We designed and taught a course about the impact of emerging technologies on teaching and learning using those same emerging technologies. And yet, in the process of teaching the course, we were profoundly surprised by how the technologies actually changed the way we thought about our own teaching. We came into what we called our "grand experiment" with what we believed were the key social trends and technologies that would be transformative. We described these in the first two themes, regarding the shift from consumer to producer and the emergence of the real time, one button web. We built our course to work with these trends. What we found was that two equally, if not more powerful, themes emerged: multi-channel discourse and the social construction of knowledge. Through our students, we learned

that technologies not only emerge in parallel with current social patterns, they also transform social patterns in ways that the creators of the technology never envisioned or intended. The truth of technology's power to transform society is the nature of what it means for it to be disruptive.

References

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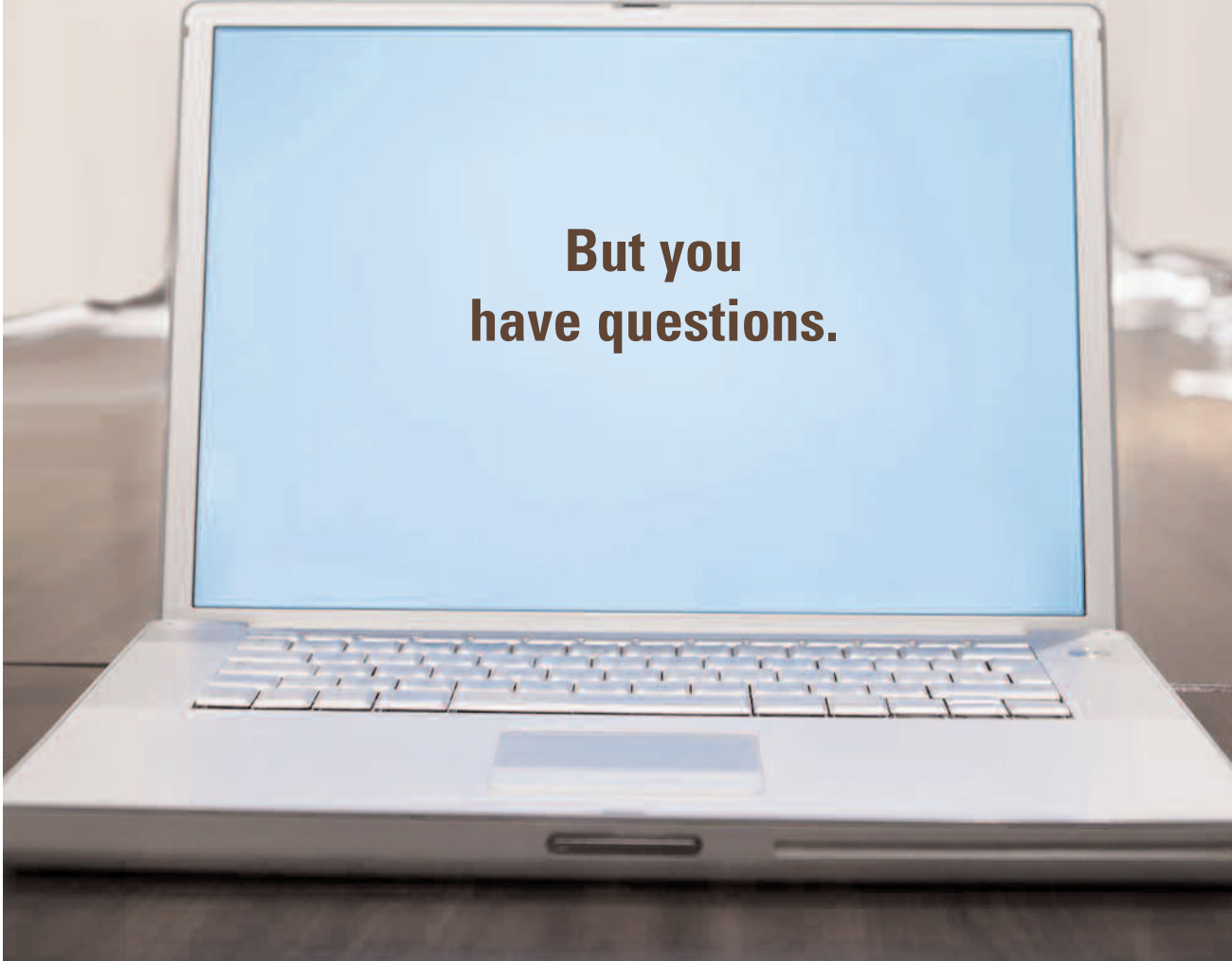
You've read *Disrupting the Classroom.*

You want to try some of things that Camplese and McDonald mentioned.

But you
have questions.