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Ubiquitous Knowledge is Changing Our Pedagogy

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Abstract

Over 50 years ago, Marshall McLuhan stated, "the medium is the message"(McLuhan, 1964). McLuhan's point was that the particular technology used to communicate a message will impact the content of that message. As teachers integrate technological tools into their teaching, so their pedagogy must adapt. In this chapter some constructs will be presented that can be used as tools to analyze new technological applications in relation to the content of a class to maximize student learning. Three main categories of information technologies are reviewed: reflective, collaborative, and social interactive.

Ubiquitous Knowledge is Changing Our Pedagogy

Almost 50 years ago, Marshall McLuhan stated, "the medium is the message" (McLuhan, 1964). McLuhan's point was that the particular technology used to communicate a message will impact the content of that message. Put another way, the tools used for construction influences what can be built. For example, reinforced concrete allows skyscrapers reaching over a quarter mile into the sky to be built. As teachers integrate technological tools into their teaching, so their pedagogy must adapt. In this chapter, some constructs will be presented that can be used as tools to analyze new technological applications in relation to the content of a class to maximize student learning.

Background

To help understand the context of using these analytic tools it is useful to review several historical examples of similar instructional adjustments that were made in teaching when a new technology was brought into the classroom. The technology of printed books and eventually easy access from voluminous libraries required students to know how to reference authors and ideas presented from many countries and historical eras. With these advancements came a stronger focus on how well students manipulated and synthesized information. It wasn't that this kind of thinking did not exist before the technological advance, but the advance made the use and mastery of such skills a more dominant standard of achievement (McLuhan, 1961).

The amount and nature of technological advancements in this era have launched education into a revolutionary stage (Christensen, Johnson, & Horn, 2008). Educators are challenged with how to integrate new technologies into the learning process. Technologies, such as lecture capture, Google docs, discussion boards, Skyping, among many others, can be used in a traditional lecture-style classroom to little additional benefit; alternatively new pedagogies matching the information technology revolution can be created to maximize the potential of these technologies. Figuring out what the instructional strategies are that are driven by these new technologies is where the challenge lies. Instructors need to analyze their practice and adapt pedagogical strategies to integrate new technologies into their instruction.

An example is the difference between a classroom in which a blackboard (with chalk) is used and a second classroom in which PowerPoint is used. Using a blackboard, the instructor usually writes on the board as the lecture proceeds, students take notes, and the board is erased at the end of the lesson. Whereas, a PowerPoint is prepared ahead of time, students can make notes on a handout of the slides or on their own laptop, the PowerPoint is shared with the students electronically, and it is preserved beyond the classroom.

In a classroom with a PowerPoint lesson, the instructor could just write the same materials on the PowerPoint as on a blackboard. However, if the instructor knows how to take advantage of the components of PowerPoint, there could be graphics, movement on the screen, links to related sources including video clips, and questions to check for understanding. Students can listen to the presentation live in class, review it at home off a home computer, take time to look at some of the added links the instructor did not play in class, and email the instructor with questions they may have about the content. Time spent in class the next day may best be used working with other students discussing the different resources accessed the previous night about the subject. Students will share the varied information they have gathered and delve into high-level questions about the topic. The instructor will move about the classroom, engaging with students on the particular conversations they are pursuing (Sams & Bergman, 2012). This process, developed in the high-tech era, more closely reflects a knowledge-creation industry model process. While none of the practices used in the PowerPoint example are inherent to using PowerPoint as an instructional tool, using these study and thinking skills becomes easier, more natural, and more necessary in an effective classroom of the information age.

There are three foundational uses of information technologies to be brought into the classroom. Instructors can analyze their curriculum and instruction in relation to these functions of technology and make corresponding changes in their pedagogy to take greatest advantage of these tools of the information age.

The Process

Information technologies can be put into the three different functions they serve in knowledge work. These three groups are

- reflective—the ability to replay and rethink;
- collaborative—group work on tasks; and
- social Interactive—utilizing a forum for exchanging ideas.

Reflective

Reflective technologies allow for the storage, retrieval, and manipulation of information. The traditional 20th century classroom had two major sources of information, the professor in front of the room and the textbook that the professor chose. The professor's information could only be accessed during the class lecture or through student notes after the lecture. Today, technology has increased the ease with which students can access information and the number of sources that can be utilized. Lectures can be recorded as podcasts or videos for later replaying and reflection by the user. Information, be it a lecture, textbook, or video, can now best be categorized as learning objects. Learning objects have proliferated on the internet, which is open for business any time of the day. Learning objects can also be posted by anyone who wishes to post information. As a result, learning objects are now ubiquitous. Thinking of information in this light allows users to choose a format similar to their learning style but also requires attention to evaluating the quality of the source of information.

Multiple sources of information are the norm for learning in our society. Students must use analytic skills to evaluate the validity of information sources. Using multiple sources and examining multiple viewpoints requires the ability to synthesize information. Instructors must be open to accepting that similar concepts can be learned through reading a textbook, listening to a podcast, or watching a video. Given that there is now this abundance of information informing instruction, assignments should be designed to allow students to take advantage of these multiple sources.

When instructors record their lectures, not only can students replay these at home but the classroom utilization can be changed to take advantage of this technology. During class time some students may be assigned to watch the lecture while the instructor works individually with other students. After a while the groups in class can switch activities. Instructor time attending to individual student needs is increased in this manner. The flipped classroom movement has been most noted for developing these new techniques for taking advantage of reflective technologies (Sams & Bergman, 2012).

The manipulation of information with technology is seen in tools such as electronic spreadsheets, computer simulations, and automated feedback systems. Content taught in classrooms has changed due to the new knowledge and skills generated with these tools. For example, the growth in the field of discrete mathematics has been accelerated by computational tools and is now used in so many industries that, today, discrete mathematics is introduced as part of the math curriculum in the elementary grades (DeBellis & Rosenstein, 2004). Students in statistical analysis classes now spend the majority of their time learning how to enter data into complex statistical spreadsheets and programs, and then how to analyze data generated from these applications rather than the memorization of formulas and number-crunching processes taught just 30 or 40 years ago. The spell-checking function on word processing has thrown into question what level of mastery spelling of words should receive in the curriculum. The increased ability to use data analytics in the programming of instruction is leading to the proliferation of adaptive learning technologies used in all aspects of the learning process. Clearly, all of these technological advances have changed both what is taught in the classroom as well as how it is taught.

Collaborative

Collaborative tools allow for multiple users to work on one project synchronously or asynchronously. In this information age, knowledge workers spend much of their time collaborating (Rosen, 2009). Shared document applications are used more often in the workplace and hence are showing up as classroom expectations as well. Google docs and wikis are examples of applications that allow many users to contribute to one document all at the same time. This ability to effectively work with others on one document at the same time requires high-level group work and people skills. Instructors should be conscious to teach about additional

thinking and group work skills as they have students working on these kinds of collaborative assignments.

Another use for collaborative applications can be to collect the outcomes from breakout groups. Rather than collecting information from each group on flip charts, the information can be added to one document by all the groups at the same time. The document can be projected on a screen for all to see as it is being created. The use of collaborative applications is sure to be developed far more in the coming years, and instructors can advance group activities by utilizing these technologies.

Social Interactive

While the reflective applications of technology tend to decrease focus on human interaction, the collaborative applications increase the need for effective human interaction. Perhaps it is appropriate that the third category of technology applications for education focuses on social interactions.

The process of learning information usually involves some aspect of the learner discussing the information with others to better understand it and put it to memory. Traditionally, these types of educational discussions might happen in a classroom between professor and students or between students. The advent of online learning has advanced how learners accomplish this social interaction. Online discussion boards are one tool used to accomplish this social interaction. However, in many instances, first uses of discussion boards have tended to be very stilted and do not mirror the natural give and take of a face-to-face conversation. Outside of the classroom, the use of Facebook has been quite captivating for many people who might not connect with discussion boards. Elements of Facebook formatting of interactions can be brought into the online classroom to enliven discussion boards.

Another tactic for increasing effectiveness of social interaction applications may be to adapt the way interactions are posed. Instead of posing a question, students are given a relevant activity in which to engage. The instructor poses himself in the multiple roles and the students work their way through the activity. The level of student participation in this model increases dramatically. The questions and the tasks posed for online social interaction applications need to be different to activate student interaction. As in the other applications being used in the information age, to be effective social interactions online must include some upper levels of Bloom's Taxonomy thinking.

Conclusion

Just as McLuhan stated, "the medium is the message," (McLuhan, 1964), knowledge tools of the information age are shifting the tasks performed in personal lives and at work. As such, the skills of manipulating technology should mirror the skills of the knowledge worker in our world filled with ubiquitous knowledge. Evaluating the content of any class in regard to how these skills are treated with the technology applications in the three main areas of reflection, collaboration, and social interaction should lead to new and more effective pedagogy for the information age.

References

Christensen, C., Johnson, C.W., Horn, M.B. (2008). *Disrupting class, expanded edition: How disruptive innovation will change the way the world learns.* Boston, MA: McGrawHill.

DeBellis, V.A., Rosenstein, J.G. (April 2004). Discrete mathematics in primary and secondary schools in the United States. *ZDM Mathematics Education, 36*(2), 46-55.

McLuhan, M. (1961). *The Gutenberg Galaxy: The making of typographic man.* Toronto, Canada: University of Toronto Press.

McLuhan, M. (1964). *Understanding media: The extension of man.* New York, NY: McGraw Hill.

Rosen, E. (2009) *The culture of collaboration: Maximizing time, talent and tools to create value in the global economy.* San Francisco, CA: Red Ape Publishing.

Sams, A., Bergmann, J. (2012). *Flip your classroom: Reach every student in every class every day.* Eugene, OR: International Society for Technology.