

Mobile Learning and the Disruption of Education

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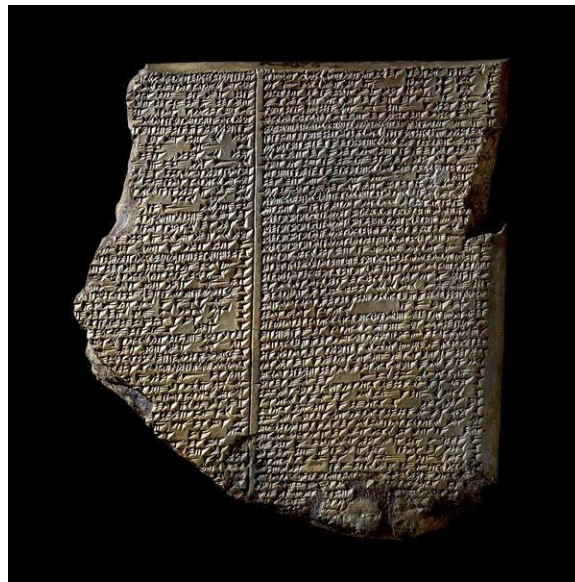
This brief paper makes a bold assertion – that we are living during the time of a true transformation of education – a transformation whose magnitude has only been experienced twice before in history. As in the two transformations that preceded this one, educators and educational leaders need all the help they can get to take the lead in transforming educational practice in support of all learners.

Our task has three parts: exploring the cause and impact of the major educational disruptions, looking at the response of those who lived during the time of great educational change, and some thoughts on how we need to change during the most recent disruption. As the title of this briefing suggests, I am of the belief that our current disruption is the result of the rapid rise of ubiquitous mobile technologies that have brought the Library of Congress (and other powerful tools) into schools through the pockets and backpacks of students. But before getting to this topic, let's go back in history to gain some perspective.

The first major disruption to education dates back to the invention of the phonetic alphabet about 5000 years ago. While the exact dates and styles of phonetic alphabets are beyond the

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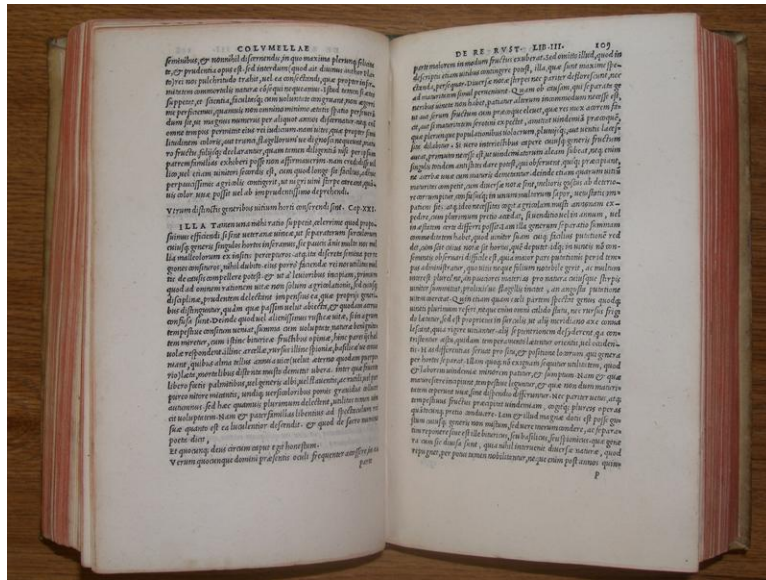
scope of this document, the cuneiform language, Akkadian, was used to inscribe the Epic of Gilgamesh, reportedly the first authored work, probably 3500 years old. The “freezing” of this story into written form in a manner that has allowed it to be read today was a tremendous break from the pre-alphabetic storytelling in which stories were held (and changed) by the storytellers themselves. Prior to this time, education relied on the storyteller, as there was no way to permanently capture the stories so they could be passed, unchanged, to future generations.



Fragment of the Epic of Gilgamesh c. 1300 bce

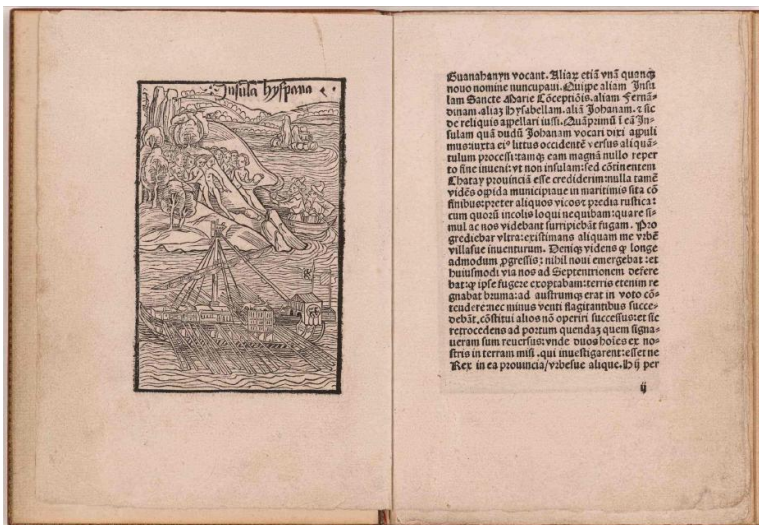
Over time, education embraced writing and, by the Middle Ages, students were able to create their own libraries by listening to lecturers who read from books as the students transcribed their words verbatim.

But this model of education, which by this time likely had lasted for a millennium, was itself disrupted to its core by a new invention – that of the pre-printed book. If Gutenberg is credited with bringing moveable type to Europe, the breakthrough leading to mass-produced books came from the Italian printer, Aldus Manutius, whose Aldine press printed books in anticipation of their future sale (rather than printing them one at a time for a single customer). By developing a small readable typeface (we now call *Italic*), books could be small enough to carry around, and inexpensive enough to print that literacy spread quickly. Some have even gone so far as to suggest that this development was one of the triggering events for the Renaissance.



Aldine book showing Italic type, 1531 (author's collection)

But the impact of the book was established well before Aldus went into business. In 1493, after returning from his trip to the new world, Columbus wrote a small book on his trip that was immediately translated into several languages, and copies found their way to Cabot and the other great explorers, resulting in an explosion of interest in exploring the Americas. The impact of this 15-page book was so great that some have argued it was the press that had discovered America (Levinson, 1998).



Columbus book on discovery of new lands, 1493.

As for formal education, just as the monks in the scriptoria resisted the mass-produced book,

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so did the teachers of the day who likely were fearful that they would have to change their methods of teaching if students showed up in class with their own books.

Of course, in time, books became commonplace, leading to schools as we know them today where textbooks are commonplace. And, in the face of this development education saw a threat on the horizon – the rise of the personal computer and the Internet. As computers came into schools, they came in slowly and under close supervision so as not to upset the status quo. Initially, computers were relegated to labs where they were literally chained to the walls to keep them in place (and out of the classroom itself.) This exactly mirrored the world of the ancient books that were also chained to tables in the library so they could not be moved to other places.



Old book with chain intact (from the collection of Roger Wagner)



Modern computer lab security cable

After awhile, ways were found to bring computers into classroom in ways that did not threaten the existing pedagogy. By replacing blackboards with interactive whiteboards, teachers could still maintain traditional teaching practices while claiming to embrace technology. As for technology in the hands of children, MIT Professor Seymour Papert was the Aldus of our age, fighting to get the power of these machines in the hands of the children themselves. Schools argued that computer technology was powerful, but that school budgets were not high enough to provide technology for every child, thus locking the old model into place for awhile longer.

Then, when netbooks started to appear in 2009, it became apparent that it was cheaper to buy a computer for every child than it was to fill a child's backpack with textbooks. And even with this "cost issue" completely resolved, schools, in general, did little to nothing in support of placing technology in the hands of children.

Let me be clear: Not providing students with powerful computers is equivalent to not teaching them the alphabet, or not providing them with books.

But then something amazing happened, leading to the current (and third) major disruption in the history of education. Children started getting their own technologies – starting with cell phones, and rapidly migrating to today's smartphones and other mobile devices like tablets. With major retailers offering smartphones for free with a two-year contract for service, there is little barrier for students to get their hands on the most powerful technology many of them have ever owned. Furthermore, these devices are true anywhere, anytime learning tools.

T-Mobile
authorized dealer

T-Mobile Sidekick® 4G

- Android™ 2.2 OS
- Dual Cameras + Video Chat with QIK™
- Group Text™ and Cloud Text™

FREE SHIPPING

FREE

for new customers with new 2-yr. activation & web service

verizon

DROID 2 GLOBAL BY MOTOROLA

- Android™ 2.2 OS
- 1.2 GHz processor
- Slide-out keyboard

FREE SHIPPING

FREE

for new or upgrade customers with 2-yr. activation & \$30/mo. data pak

From Target ad, August, 2011.

At the time these words were written, over 600,000 new smartphones were registered every day of the week. Given that these phones include cameras, full-Internet access, and the ability to run thousands of applications, it is obvious that this technology will be commonplace in student hands very soon.

Now, if schools had chosen to provide students with technology, they could have established how it was to be used. But that time has past, and students have taken matters into their own hands. Districts that, a year ago, blocked access to school networks by anything but school-approved devices are now rushing to establish “BYOD” (bring your own device) policies into place, in which student smartphones and other devices are allowed to be connected to school networks.

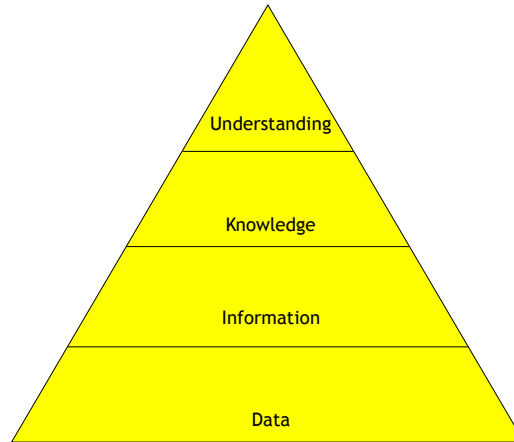
But the real challenges are not technological, they are pedagogical.

At one of my speeches this year, an educator said that students would use these devices to “cheat.” This is a complaint I have heard many times in the past, and – depending on your form of pedagogical practice – this teacher was correct.

My response was that the problem was not that the student was using Google to look up answers, but that we had asked questions for which Google provided the answer. This was not intended to be a flip response – it was merely a statement of fact. If our measure of educational achievement is the ability to recite information that was presented by the teacher or a textbook, then Google (and Wikipedia, and ...) provide far richer resources than the memory capacity of a child. But, on the other hand, if the student is asked a deeper question, then Google becomes one of many resources a student might properly use to formulate a

thoughtful and original response that not only provides the student with the content knowledge we ask, but also develops deeper thinking skills.

Consider the following model:



This triangle depicts a hierarchy of content from data to understanding. At the bottom is raw data – the sort of thing that makes up a lot of content on the Internet – names of State capitols, population of Canada, etc. Next up we have information. This, too, is found in abundance on the Internet. For example, what is the best route to drive from Chicago to New York?

At the level of knowledge we start to move into the domain of what has been internalized by the learner, based on the accumulation of data and information. For example, if I know how to factor one polynomial, I am likely to be able to factor others as well. Knowledge is good to have. But it is with the top level, understanding, that we get to the proper core of education. Understanding is built on the foundations of data, information and knowledge, but is a different beast altogether. If I truly understand something, I can share this understanding with others. It may form the basis of a deep interest, or even trigger a lifelong pursuit for deeper understanding. In short, it is the proper goal of any educational system.

When viewed against the backdrop of ubiquitous mobile networked tools carried by many learners today, “understanding” becomes the task that students pursue with the support of online (and other) tools for data and information as these components are assembled to form a base of knowledge upon which understanding can be built.

It is one thing to suggest that “understanding” is our goal, and knowing how to implement

an “understanding”-based educational program in a technology-rich environment. Multiple approaches to this task are possible, but one of the clear solutions is to make the shift from content-based learning to project-based learning (PBL) driven by powerful questions.

For example, let's look at the previous complaint that students will use these new tools to cheat. If the question is (for example) “What is the capitol of Illinois?” then, yes, this is trivial to look up online. But suppose the question is different: “What impact would be felt by the State of Illinois if the capitol was moved to Chicago?”

This question provides a rich opportunity for students to research the topic in depth (including finding where the capitol is today.) It requires a lot of data, information, knowledge, and creativity (a topic thus far left out of the equation) to formulate an answer to this question. Not only is this not “Googleable,” it is likely to result in multiple perspectives among various students in the same classroom.

But moving to this educational model is a lot of work. It doesn't happen overnight. While inquiry-driven PBL has received growing attention of late (especially in the STEM subjects), many educators need a lot of support in making the transition. For example, in addition to learning how to formulate powerful driving questions and structuring projects, the whole assessment issue needs to be addressed as well.

Fortunately, there are resources that can help with these topics.

As mentioned at the start, we are at the dawn of the third major technological shift in the history of education. While students may have taken the leadership in providing their own tools of informational access, educators and educational leaders need to make the major transformations needed to not only help learners harness the power of their tools, but to build the kind of educational environment that is needed for the balance of this century and beyond.

References:

Levinson, Paul, 1998. *The Soft Edge: A Natural History and Future of the Information Revolution* Routledge.

About the author:

David Thornburg is a director of the Thornburg Center for Space Exploration (www.tcse-k12.org), an organization devoted to transforming educational practice with the support of modern technologies. While his main focus has been in the realm of STEM (science, technology, engineering and math) education, he and his colleagues work across all subject and grade areas.

Together with Norma Thornburg and Sara Armstrong, the TCSE provides in-depth workshops and consulting to help educators make the transition to an educational model that truly meets the needs of all learners.

Contact David at dthornburg@aol.com for details or to schedule a speech, workshop, or consultancy with your school or district.