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Innovation In Education

| By Debborah Smith, Jeffrey Brand & Shelley Kinash |

Ask Not Whether Education Can Afford Technology, But Whether Technology Can Afford Education

Great educators are natural innovators because they routinely look for inspirational ways to engage and reach their students. Unfortunately, innovation is often understood mainly in terms of technology – especially hardware. This is understandable because technology is a strong product of the innovative process – even though the noun, innovation, refers to doing something in a new way. What teachers often feel, however, is that they are on the receiving end of the innovation cycle. The technology, it seems, asks for innovation in pedagogy instead of the other way around.

Consider the many technologies that have been introduced in education over the past decade and then reflect on what systems teachers and educational administrators use to evaluate and either adopt or reject these. The system is probably much like life. If the innovation does not look that useful on the face of it, or if it appears too costly, we will not use it. However, many worry that they are missing something when they pass over a technology whether it is an ebook, social media or a game for use in the curriculum.

As adoption decisions are made, it is worth using a decision system (itself a form of innovation). One such system being explored in many universities and schools is the 'affordances model'. This term, originally coined by ecological psychologist, James Gibson, in 1977, refers to the relationship between an object and a user. It describes the characteristics of any object by emphasising the opportunities it offers, or affords, a user. So, for example, an affordance of a light switch is that it is *flippable*; the design of the switch affords the basic action of flipping. Affordances can also be perceived in terms of their practical and social consequences and functions within integrated systems. So we could also say that the light switch affords the lighting up of a room (provided it is wired up correctly to the electrical system) or the waking up of a husband (so long as the husband is present in that room at that time). Affordances may be directly perceivable or may only be perceived through knowledge gained directly or through experience.

Connectivity, communication, autonomy and mobility, are primary affordances of digital technologies and it is difficult to imagine how any of us actually lived without the convenience that has resulted from these affordances. On university campuses we can see students taking advantage of these fundamental affordances of digital technologies in a variety of ways and on a variety of devices: communicating and interacting with staff and other students using email or other social media, accessing information from the Learning Management System, or by researching in web sources, digital textbooks and electronic journals in the library databases, watching YouTube clips, listening to podcasts, reviewing lectures which have been video recorded and made available on the university website, or collaborating on blogs, wikis, or other social media.

The affordances model gives us a four-step system to think about and evaluate every innovation. These steps were published by Dutch researcher Auke Pols in 2012. Pols wrote, "Defining affordances as 'opportunities for action' means that our understanding of what affordances are can only be as precise as our understanding of what actions are" (p. 113). The digital textbook is used as an example for each of the four steps.

1. Opportunity for Manipulation – This lowest level of affordances centers on simple actions and requires low cognition. Examples for digital textbooks include turning on an e-reader, installing a book, selecting and opening a book, pressing a page-turn button, swiping the screen and turning off the device.

2. Opportunity for Effect – This level of affordances recognises that after users experiment with an object, like a digital textbook, they discover the effects of their manipulations. This is a cognitive response that includes thought and emotion. The feeling of excitement when one discovers that search is more powerful than an index because it is in the control of the reader rather than the author or publisher is just one example. Similarly, the ability to change the font, type size, page margins, text colour, brightness and so on, means that nuances of comfort begin to facilitate reading.

3. Opportunity for Use – This level of affordances involves thinking, planning and coordinating complex use for a larger purpose – this is where educators relate manipulation and effect to curriculum and where innovation migrates from hardware and software to new ways of doing. In enhanced or enriched textbooks, audio can be listened to, video can be watched, and there is even the possibility of interaction with the text and images, for example with simulations, models and quizzes. The newest and most advanced digital textbooks afford the receiving of instant feedback and diagnosis of a user's understanding of the content and the creation of individualised learning paths. Setting exercises around words in textbooks to take advantage of on-board dictionaries and translators is but one example.

4. Opportunity for Action – This is the highest level of affordances with technology and the one that can serve educational technology policy most powerfully. Opportunity for action is coordinated and social. E-readers often afford highlighting and note-taking of texts on the device and to manipulate and share this content. Although many users find on-screen highlighting and notes clumsy and inefficient compared to traditional handwritten methods, the ability to share opens up opportunity for action. Making Shakespeare relevant to Year 10 students is a perennial challenge. But allowing students to mark up and suggest contemporary phrases, debate meanings and even create shorter versions of a play through social highlighting (only the parts that everyone individually highlights remain in the final text) applies the very notion of constructivist and relativist learning. As e-readers take greater advantage of social media and crowd-sourcing, the opportunities for action may well re-invigorate the classroom.

Of course, action affordances have endless, and often disruptive, potential. This is why it is critical that educators have discussions about what can be done with tools like digital textbooks. This includes not adopting. Affordances are not always advantageous. For example, reading from a digital device may cause eye strain, may deflect attention away from a critical text and may afford access to undesirable content when readers leave the text and go to the web or social media.

The greatest implication here is that if the affordance is not perceived, there is no opportunity for action. Interviews with lecturers at Bond University demonstrated universal understanding of manipulation affordances of educational technology such as digital textbooks. However, there was considerably less knowledge of effect, use and action affordances. Where knowledge of a higher-level affordance did exist, time constraints were identified as impediments for further exploration. Yet, experience is a predictor of perceiving an affordance. Only through 'playing' with digital textbooks can educators discover their affordances. Doing so may also force a rethink of teaching practices and curriculum design. Just like any other digital technology, there needs to be consideration of how to best incorporate

the affordances into the curriculum design for even with the best intentions, teachers may find their attempts to be innovative with the use of technologies in the classroom fail to engage the students in a meaningful way. Affordance theories show us that both structure and flexibility are essential in achieving learning outcomes through the use of digital technologies.

The following strategies demonstrate how these theories look in practice and how teachers can apply affordance theory in their classrooms.

• Enable students to perceive the potential affordances by: ensuring they understand how to use the technology, modelling the activity and providing examples of desired outcomes.

• Recognise individual learner differences with regards to technologies and the types of resources students prefer to use. For some students, flicking through a printed book works better than searching the web. Creating a group wiki may be the ultimate goal, but planning on paper can be an effective part of the process.

• Allow for varying levels of knowledge of a technology. Prior experience with the technology is a valuable resource in any group. Individuals with a better understanding or prior experience can be given a role of being 'technical assistants' to the less experienced members of the group, which may even include the teacher.

• Be flexible with the learning space. Even if students are working primarily on mobile devices, it can be helpful to be sitting in such a way as to allow discussion with one another.

• Play with technology. Sometimes there are affordances just waiting to be discovered.

As stated at the beginning, great educators are natural innovators because they routinely look for inspirational ways to engage and reach their students. This requires not just the knowledge of the technology and its affordances, or which medium works best, but how to incorporate it most effectively into the learning and teaching context. ⓔⓣⓢ

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