

Selected research for the appropriate pedagogical affordances of technology in education: An annotated bibliography

Educational technology as a theoretical faculty is still struggling to define itself. It is stuck firmly between a commercial, corporate, incredibly well-resourced and well-funded private sector wanting to drive sales of new “tech tools” and; a mostly public, under-resourced, theoretically-grounded, passionate workforce of educators. This selection of research outlines the challenges that the educational sector faces in the application of traditional learning theories to affordances with technology. The author will argue that whilst learning theories have continued to develop they have little influence on technology, its design and development cycle. Educational institutions have affordances to technology just as businesses first did, to improve efficiency, productivity and reduce labour costs. This “technology” however has also entered classrooms and improved administration tasks, tracking of learners, differentiation, testing data, ensured consistency of content delivery (online), but is there a theoretical position for this? Are these affordances simply because educators were told “make this work” or are there appropriate pedagogical affordances?

Conole, G., & Dyke, M. (2004). What are the affordances of information and communication technologies?. *Association for Learning Technology Journal*, 12(2), 113-124.

Conole and Dyke believe that ICT (information and communication technologies), or educational technology as commonly referred to in the United States of America, have affordances to facilitate approaches to educational practice. Based on Gibson’s (1979) concept of affordances the authors propose a taxonomy for the use of ICT in education.

Accessibility, speed of change, diversity, collaboration, reflection, multimodal, risk, immediacy, monopolisation and surveillance are all classifications linked to learning theories. The authors are critical about the superficial implementation of technology to date and how research is predominantly case study based and not focused on developing the underpinning learning theories associated with its use. It is a well-balanced and thought provoking discussion piece but possibly proposes more questions than it answers.

De Castell, S., Bryson, M., & Jenson, J. (2002). Object lessons: Towards an educational theory of technology. *First Monday*, 7(1).

Here is a portrayal of quite cynical proportions where educators who proselytise educational technology are seen as “miracle workers” putting their economic interests ahead of educational ones. The authors are tired of the education sector being asked how it could use a particular technology and would rather the focus that educational theory comes first before the technology. They appear to take an obstructionist view to even the likes of Seymour Papert and his foray with digital tools, and label much of educational technology “a template-based system of cognitive compliance”. The concern is that the marketplace has created “partnerships” with schools and driven home theories of educational technology which we take for granted, whether good or harmful. The authors purpose seems to be to enrage the reader and it challenges them to look for a “educational theory of technology” and not “theories of educational technology”. They believe that “such a theory of educational technology would offer material grounding to a rethinking of educational epistemology”.

Wilson, B. G. (1997). Thoughts on theory in educational technology. *Educational Technology*

-*Saddle Brook NJ*-, 37, 22-26.

Why is a theory important? Wilson refers to Suppe's (1997) definition that a theory usually connects observations and evidence. This herein may be the challenge as to why a clear educational theory in technology has not yet emerged - the evidence is never in. The landscape is constantly changing, new technology is developed, faster processing speeds, new content is created, better collaboration tools are generated - how do you manage learning and knowledge acquisition in an environment as fluid as this? According to Wilson, "if we stake our future on specific models and theories, then we're in trouble. If we show an unwillingness to examine our foundations and adapt to evolving needs, we're in big trouble." Whether it is cognitivism, behaviourism, or constructivists who have moved to postmodern positions, they all must ask the "big questions" - where can technology help learning? When should it help and when shouldn't it?

Sana, F., Weston, T., & Cepeda, N. J. (2013). Laptop multitasking hinders classroom learning for both users and nearby peers. *Computers & Education*, 62, 24-31.

Fascinating research on the negative consequences of multitasking, particularly for learning whilst using a laptop in-class. Participants in a simulated classroom were found to score lower on a test when compared to those who did not "multitask" on their laptop and this effect also flowed on to nearby peers who were visually distracted by the screen of the multitasker. This study was conclusive and brings to the forefront concerns that many high level users of technology already have - is multitasking really helping me? Whilst this study does not address the productivity side of the argument it does clearly indicate it is not efficient or effective during

learning. This should raise concerns with educational technologists who have technology in-class “always on”. As Wilson (1997) explained previously, you have always be asking the questions - is this appropriate use? Does this help the learning here? If the answer is no, the don’t use it.

Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & Education*, 52(1), 154-168.

Contextually it is the advent of our innovative world and the “continuous transformation of our cultural, social, and political environments” that has meant the learners of today live in an information-rich world, where ever-increasing importance is placed on how learners utilise that information. To think critically, problem solve, collaborate globally and to seek different perspectives are skills educators must deliver. In this article it is argued in great-detail that “technology has extensive pedagogical affordances and great potential for transforming the teaching and learning environment when it is used appropriately. (Cognition & Technology Group at Vanderbilt, 1996; Dede, 1998; President’s Committee on Advisors on Science, 1997)”. The authors suggest that TPCK is a distinct body of knowledge that can be developed and assessed. They don’t subscribe to the integrative view of the framework as the current body of literature on TPCK does. They illustrate with empirical case studies how growth in knowledge of any of the related individual constructs (i.e. pedagogy, content, technology) does not automatically contribute to growth in TPCK. This therefore supports the notion of educational technology as a stand-alone body of knowledge worthy of further study.

Day, D., & Lloyd, M. M. (2007). Affordances of online technologies: More than the properties of the technology. *Australian Educational Computing*, 22(2), 17-21.

A short, well-written paper that clearly argues “it is too simplistic to view learning outcomes as depending solely on the properties of the technologies... they result from a complex interaction of factors that contribute to a learning context”, and affordance theories support this view. The two scenarios presented are simple and yet powerful in highlighting the context of learning, including the values and beliefs of the teacher in reference to the importance of ICT and “of the affordances of a range of ICT resources”. This highlights once again the importance of a framework like TPCK where an educator can draw on their own epistemology, their content expertise, and the relative affordance with ICT in the context of what is being taught. It is frameworks like TPCK that allow teachers to employ their theories of education to technology and not the other way around.

Issroff, K., & Scanlon, E. (2002). Educational technology: The influence of theory. *Journal of Interactive Media in Education*, 2002(1).

In this review of the influence of theory on educational technology the authors assess the landscape purely from an educational technologists point of view. They document the historical changes on knowledge from the industrial-age to the information-age. Of particular importance in the early days of the field is distance education and the instructivist approach to designing learning was popular before constructivism became the dominant learning theory. This then led to situated learning and the design of computer simulations across a variety of learning areas. Most fascinating was the recurrent theme that educational technology or ICT did not itself

subscribe to any one learning theory, and up until 1996 in the field handbook there was only one reference entry for theory. As with Wilson (1997), Day & Llyod (2007) the authors put forward the notion that education technology is a “design science of education” and hence must consider the context of the learning environment it is being used in before a learning theory can be applied. Perhaps controversially they also conclude with the statement that “there are no current accepted norms for the use of theories in educational technology”, Angeli & Valanides (2009) might disagree.

References

- Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & Education*, 52(1), 154-168.
- Conole, G., & Dyke, M. (2004). What are the affordances of information and communication technologies?. *Association for Learning Technology Journal*, 12(2), 113-124.
- Day, D., & Lloyd, M. M. (2007). Affordances of online technologies: More than the properties of the technology. *Australian Educational Computing*, 22(2), 17-21.
- De Castell, S., Bryson, M., & Jenson, J. (2002). Object lessons: Towards an educational theory of technology. *First Monday*, 7(1).
- Issroff, K., & Scanlon, E. (2002). Educational technology: The influence of theory. *Journal of Interactive Media in Education*, 2002(1).
- Sana, F., Weston, T., & Cepeda, N. J. (2013). Laptop multitasking hinders classroom learning for both users and nearby peers. *Computers & Education*, 62, 24-31.
- Wilson, B. G. (1997). Thoughts on theory in educational technology. *Educational Technology -Saddle Brook NJ-*, 37, 22-26.