The Importance of Learning Philosophies on Technology Selection in Education

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Abstract

Educators are often overcome by the daily concerns of the classroom so they tend to focus on what has worked in the past. It seems a luxury to take the time to ask the more fundamental question: what is learning? Yet this question lies at the fore of our profession and defines our choice of teaching methods.

It has become a truism that social interaction is essential to the educational process. Furthermore, the ubiquity of technology, with its capabilities and its hold on users, has generated endless suppositions about its potential in education. We are told that technology is transforming education.

However, at the heart of education lies a philosophical schism about the nature of knowledge and learning. Technology choices depend on and will amplify our teaching philosophy, so examining our assumptions about teaching is essential when designing appropriate learning interventions.

This paper explores Socratic, behaviourist, and constructivist views of learning and explores how social interactions is framed within each of these theories. What types of interactions matter and how can we facilitate them utilising contemporary technology? It is proposed that learning philosophies are a fundamental but oft-overlooked consideration for teachers, who would do well to choose a particular model and apply complementary approaches.

Keywords
Learning theory, technology, Behaviourism, Constructivism, Socratic Method

What is Learning?

The Nature of the Learner

The once popular notion of the individual as tabula rasa, the blank slate or empty receptacle, infinitely impressionable and primed for learning, is an appealing one. Such a reality makes students perfect learning machines, their minds indelible media on which to imprint the fundamentals of a harmonious community: conformity to societal norms, the means to engage in practical enterprise, and acquiescence to authority.

Some educators find such notions appealing. Educators existing in a state of moral and epistemological unambiguity, for whom there is a simple and correct outcome of education, will be gratified to know their efforts will succeed due to the malleability of their students. Pragmatic teachers would benefit too, as teaching this type of student would be relatively easy and predictable; education as mass production quickly and efficiently creates learned individuals, shaped by their educated superiors and ready to teach the next generation.

However, logic and evidence suggests this view of the individual as tabula rasa is flawed. The most fundamental reason is that genetics, unique to each individual, play an important part in brain development (Lumsden, 1983; Rose, 1995). We are not blank slates from birth, and individuals may respond differently to a given stimulus. Traditional notions of rational behaviour are flawed, and people often act in ways that defy logical predictions (Kahneman, 2011).

Furthermore, even if children were born as empty receptacles for learning, experiences vary rapidly from the day of birth. Given that our lives are built on a chaotic footing of non-linearity and randomness that can amplify even the smallest differences, slight variations at the start of life, including in education, can lead to infinitely divergent results later (Gleick, 1997; Taleb, 2010).

Finally, applying the idea of tabula rasa is unhelpful because it overlooks the rich tapestry of experience from which all learners, especially adults, draw. It relegates the learner to the status of passive participant in the act of learning, and commits an act of intellectual arrogance that can blind a teacher to the potential to learn from the student, and for students to learn from each other.

The learner must be considered an active participant in the learning process, at the very least with strengths and weaknesses and viewing learning through the lens of experience. At the most, each learner can be considered an equal co-creator of knowledge.

The Nature of Knowledge

The nature of knowledge is fundamental to understanding learning. However, a treatise on epistemological and ontological thought would take volumes. Boghossian (2006) provides a concise summary of three key views espoused by thinkers including Aristotle, Vico, Piaget, and Skinner. According to Boghossian, the Socratic approach, characterised by dialectic dialogue between individuals, seeks to uncover objective truths about reality by exposing contradictions. Importantly, it is not the instructor's job to impart knowledge, but to help both participants recognise it. Behaviourists, such as Pavlov, Watson, and Skinner, also believed in an objective reality independent of the learner. For behaviourists the objective is to impart to the learner knowledge of reality. Finally, constructivists such as Dewey, Piaget, and Vygotsky, contended that an objective reality independent of the learner is not possible. Instead, each learner constructs a subjective understanding of the world.

Social Interaction and Learning

The three approaches to learning outlined above are fundamentally different, yet all incorporate social interactions, whether to discover the truth, impart knowledge, or to collectively construct knowledge. However, as will be discussed in detail, it is social constructivism in which social interactions are most important and varied.

To behaviourists, many of whom incorporated the notion of tabula rasa (McLeod, 2007a), learning is not about self-discovery. Instead it is a matter of conditioning responses to stimuli (Boghossian, 2006; McLeod, 2007a; Siemens, 2004). The internal process of learning cannot be known, so the focus is on externally visible behaviour. There is an objective, independent reality, and it is the job of the teacher to impart knowledge of that reality or condition patterns on the learner. Thus, social interactions are important, but the focus is on teacher-to-student exchange, and generally limited in scope.

Social interactions play a particularly important role in constructivist ideas, which is the dominant ideology in today's educational landscape (Boghossian, 2006). Constructivist views of learning tell us that experience plays a crucial role in what students learn. Learning is not a matter of acquiring objective, discrete quanta of information, but of constructing meaning through socially mediated experiences (Boghossian, 2006; Kozulin, 2012). For example, Piaget (as cited in McLeod, 2009) described a child's development of schema that progressed through cycles of equilibrium, or understanding, and disequilibrium when faced with new information. A return to equilibrium, which involves modifying schema to coherently incorporate new information, is generally facilitated by an adult or knowledgeable other.

The Vygotskian elucidation of social constructivism takes these ideas even further (McLeod, 2007b). Vygotsky introduced the concepts of the More Knowledgeable Other, Zones of Proximal Development, and the inseparable link between thinking and speech. The More Knowledgeable Other, as the name suggests, holds more information or greater skills than the learner, and is able to assist in the construction of new knowledge. Related to this is the idea of Zones of Proximal Development, or the difference between what a learner can achieve independently, and what he or she is able to achieve with the assistance and encouragement of the More Knowledgeable Other. This view justifies the place of the teacher by contending that a learner is generally able to learn more with the assistance of a More Knowledgeable Other, the teacher, than when working independently. Finally, Vygotsky argued that speech and thought are inextricably linked, since word meaning determines the nature of thoughts, and conversely, thoughts are expressed through language (Kozulin, 2012). Social interaction plays another key role in social constructivism: individual ideas and meanings become shared meanings, or intersubjectivity (Sharples, 2005; Stahl, Koschmann, & Suthers, 2006; von Glasersfeld, 1989), as group members negotiate a common understanding.

The Socratic Method provides a useful historical perspective and counterpoint to the other theories. The Socratic Method, and other forms of dialectics, places teacher and learner in a position to collaboratively discover knowledge (Boghossian, 2006). Discourse, usually between a teacher and student, though possibly between students, is an essential and defining component of Socratic approaches to learning, utilising a process known as elenchus of questioning propositions to determine their truth or falsity. However, unlike constructivist approaches, the highly structured discourse of the Socratic aims not to create knowledge, but to converge, by way of iterative questioning, on an objective truth about a knowable reality. At first, this appears to be an alternative formulation of the behaviourist paradigm. However, as Boghossian (2006) tells us, the behaviourist approach is to provide the truth to students, whereas the Socratic Method requires that a student comes to the truth rather than simply submitting to a teacher's explanation. Though subtle, it is an important difference, and means that the Socratic Method provides an alternative to constructivist and behaviourist approaches.

Implications for Teaching

Teaching Focus

Teachers often act on intuition, experience, or advice rather than consciously adopting a specific learning philosophy. However, such a choice is important, since it will impact on perception, practice, and effectiveness.

As previously discussed, social interactions play an important part in many leading learning theories, but the differences impact heavily upon lesson design. A behaviourist approach is likely to favour the transmission of information (Boghossian, 2006; McLeod, 2007a), such as through lectures, video, and text. Social interactions are likely to be predominantly one way – teacher to student, except in seeking clarification or testing understanding. For social constructivists, interactions are as important as artefacts, and practitioners are likely to favour collaborative environments. Opportunities for dialogue will be pursued, and, depending on the context, may include play, group assignments, debate, role play, and exposure to opposing views. Contradictions, which may be eschewed by behaviourists, are important to constructivists since they drive learner development (Issroff & Scanlon, 2002), and essential to Socratic practitioners, since they offer opportunities to discover and reject false propositions (Boghossian, 2006).Socratic teaching methodology will create directed, sustained teacher and student dialogue.

Technology and Learning

The term "technology" can cover the gamut of human endeavour, and in an educational context may as easily refer to a piece of chalk as to a laptop computer. For the purposes of this paper, technology refers to contemporary digital technologies that can be used to support teaching, such as computers, the Internet, and associated hardware, software, and infrastructure. However, it is worth noting that the principles of the learning theories explored herein would likely apply just as

well to older technologies, and though these tools may be applied differently, the assumptions and objectives of the theories would remain the same.

Technology amplifies opportunities for communication; people are able to communicate more rapidly, more widely, and in more ways than was previously possible. Yet, technology does not necessarily improve learning outcomes, and should be applied carefully. As Stahl, Koschmann, and Suthers (2006) pointed out, technology should be utilised for its unique properties to enhance learning, rather than being forced into an unsuitable role. They claim three important properties of technology for supporting group interactions. First, technological solutions can be reconfigured to suit the circumstances and adapted to the interactions that are taking place. Second, technology mediated interactions produce artefacts that can be stored, reused, transmitted, or modified. Finally, technology can analyse the state and sequence of interactions, and adapt to influence educational processes.

Indeed, there are other properties of technology that make it a powerful educational tool, such as its availability anywhere and anytime. However, some benefits will present only in specific contexts, so applying technology according to an educational philosophy is important if it is to be effective.

A behaviourist methodology is likely to favour the ability of technology to reach a broad audience with a range of media. A single teacher can have an enormous effect, since it is possible to endlessly reproduce and transmit artefacts without losing fidelity. Technology can help reduce the barriers of time and distance between students and teachers, make a richer variety of content available than traditional methods, offer new means of assessment, and save artefacts and interactions for later review by students.

Contemporary technology arguably offers even greater potential for social constructivists. There are endless opportunities for communication, and every interaction is educative (Dewey, as cited in Sharples, 2005), even those that do not involve a teacher. Furthermore, the modern internet is participatory and encourages contributions; knowledge is manifested not only as shared cognitive processes, but also as tangible artefacts. Opportunities for expression by leaners include blogs, wikis, discussion forums, social networks, media sharing, micro-blogging, video conferencing, and more. Importantly, many of these platforms have built-in facilitates for commenting and feedback, thus allowing participants to challenge ideas and negotiate meaning. Technology potentially spans continents and enables communities of practice, providing access to an incredible diversity of opinion and experience. Online environments become negotiating tables, repositories of learning products, museums of interactions, laboratories for teachers, and a media for ongoing discussion.

A Socratic method must allow teachers to quickly and easily raise questions and garner responses, generally from a small number of students. Depending on the context, a communication medium that allows rapid interactions, preferably in real-time, presents the greatest opportunities; telephones, webinars, or live chat sessions and other synchronous technologies are the most appropriate choices in this case. Other media, such as social networks or microblogging (such as Twitter) may also present viable options, as they support conversation. These asynchronous technologies have the advantages of allowing participation by larger groups of students, and generally capture a record of interactions for later review. On the other hand, complex topics or user-imposed delays may lead to excessive and untenable discussion timeframes on these media.

Technology pitfalls

While the large number of communications options and educational resources generally provide benefits, in some cases they offer no advantage, or at worst, hinder learning. Practical problems common to both behaviourist and constructivist approaches include learner and teacher access to technology and ability to use them, the increased potential for distracting learners, and the cost of developing infrastructure and resources. An often unrecognised problem, described by Hayward (2008), is that of opportunity costs in which, because of limited resources, some promising initiatives are abandoned in favour of others. For example, budgets may be directed towards the

acquisition of technology rather than teacher training. Perceptions are also important, and some students, particularly older adults, view social networking with suspicion or trepidation and may not utilise it for education, even if they participate privately (Moran, Searman, & Tinti-Kane, 2012).

There are also pedagogical and practical problems associated specifically with each of the learning philosophies. For *behaviourists*, distractions are a problem. Another is the vast number of connections and resources on the internet which are likely to expose learners to diverging, often contradictory points of view. In some cases, such as where there is heavy debate on a topic, this will be an advantage. However, in cases where consensus is held, exposure to what might be considered fringe ideas may interfere with an unambiguous understanding.

For *social constructivists*, the nature and depth of interactions is different than in traditional classrooms, and only in some cases is more effective (Gokhale, 1995). Interactions based on face-to-face discussions or long written missives, such as letter writing, involve a different level of emotional and intellectual engagement than many modern forms of communication, such as SMS messages and social media posts. As a result, cognitive functions may be restricted and literacy skills compromised when using the latter. Furthermore, despite the promise of feedback and interaction, many online messages constitute broadcasts, often superficial, with no guarantee of consumption or comment. It is not clear whether such interactions enhance learning to the same extent as more controlled, predictable classroom activities.

The Socratic Method is likely to suffer if it cannot facilitate timely and meaningful interactions between students and teachers, which will take the form of proposition, discussion, refutation, and assent. To this end, discussions are likely to be highly contextual, making it difficult to anticipate the direction and nature of questions and answers, and thus how best to support them in advance. The choice of technology may hinder the breadth of possible communications, leading to a breakdown of the elenchus process. For example, a voice-only medium will make visual demonstrations impossible, and may lead to a premature end to discussions, before assent is reached.

Encouraging meaningful interactions

The first step to encouraging effective technology-mediated interactions is to articulate what constitutes meaningful interactions, which involves researching and consciously choosing an epistemological framework. Frameworks should not be limited to those explored above; other theories abound, and, for example, Activity Theory (Engestrom, as cited in Issroff & Scanlon, 2002) and Connectivism (Siemens, 2004) expand on the idea of learning as social interactions, while explicitly acknowledging the essential role of technology and providing greater insight for lesson design.

Most interactions in a behaviourist frame are likely to be between students and content, or teacher as content provider. Teacher-driven and teacher-centric interactions are likely to be privileged compared to peer-to-peer discussions. Providing clear instructions, easy access to materials, and effective assessments is likely to increase effectiveness. Encouraging peer-to-peer interactions will be more difficult, and may need to be assessed to stimulate participation.

The desired outcomes of interactions within a social constructivist approach are more difficult to define, since the interactions in and of themselves are important. Here an emphasis is on freedom and exploration. Learners should be in control of the activity, able to experiment and collaborate with others (Sharples, 2004). Laurilliard's (2008) Conversational Framework offers a useful approach to designing iterative, collaborative learning interactions. Establishing with learners that social discourse is essential in building understanding is important, particularly with adults, who may otherwise choose not to participate. Incorporating group assignments or assessed interactions, such as forum posts, may encourage participation, but should not replace conscious choice.

The Socratic Method requires honouring both the process and the outcome. Laurilliard's (2008) Conversational Framework, with its support of an iterative questioning and clarification approach, provides a useful design tool. Teachers are likely to hold a privileged position, but they must build rapport with students and encourage active and sustained participation. The principles of Connectivism may also provide an opportunity to reframe the Socratic Method in the modern age. Both theories present a cycle of knowledge development and require the interaction of individuals, groups, and systems, in the case of Connectivism, to achieve and maintain learning (Boghossian, 2006; Siemens, 2004). The Socratic Method provides a structured framework for iteratively testing assertions between participants, whereas the Connectivist model asserts the need to continually revisit understanding, the ability to know more, the need to connect with a diversity of information sources, and the aim of identifying the answer that is right now (Siemens, 2004). Thus it may be possible to apply the Socratic Method within a Connectivist context to achieve learning.

Finally, any form of teaching requires constant self-reflection and willingness to modify behaviour. Theoretical frameworks should inform practice, but should not replace teaching experience, observations, and student feedback. An open, changeable mind and ability to adapt are essential characteristics for any teachers, especially those working with technology.

Conclusion

Education, a core human endeavour and field of enquiry since ancient times, occupies the intersection of many fields. Philosophers, sociologists, ethicists, psychologists, politicians, educators, parents, and learners all have something to say on the subject. Due to the differing views about the aims of education, and the vexatious nature of learning, a common understanding and methodology eludes us. Educators face a stratified landscape of theoretical and practical choices heavily dependent on specific contexts.

Consequently, each educator must examine the epistemological foundations of learning and make his or her own decision. Teaching practices, while incorporating experimentation and exploration, should be consistent with the learning philosophy adopted.

This paper has examined three popular philosophical views and their implications for teaching practice and the use of technology. It is hoped that this brief and incomplete analysis sheds some light on the complex interplay between knowledge, learning, teaching, and technology, and provides practical steps towards achieving an effective methodology.

References

Boghossian, P. (2006). Behaviorism, constructivism, and Socratic pedagogy. *Educational Philosophy & Theory*, *38*(6), 713–722.

Gleick, J. (1997). *Chaos: Making a new science* [epub]. Vintage. Retrieved from Kobo.com

Gokhale, A. (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education*, *7*(1). Retrieved from http://scholar.lib.vt.edu/ejournals/JTE/v7n1/gokhale.jte-v7n1.html?ref=Sawos.Org

Hayward, R. (2008). Leading a digital school: A case study - St Leonard's College. In M. Lee & M. Gaffney (Eds.), *Leading a Digital School Principles and Practice* (pp. 80–92). Melbourne, Australia: ACER Press

Issroff, K., & Scanlon, E. (2002). Using technology in higher education: an activity theory perspective. *Journal of Computer Assisted Learning*, *18*(1), 77–83. doi:10.1046/j.0266-4909.2001.00213.x

Kahneman, D. (2011). *Thinking, fast and slow.* [epub] *n.p.*: Farrar, Straus and Giroux. Retrieved from Kobo.com

Kozulin, A. (2012). Foreword. In L. Vygotsky, *Thought and language.* MIT Press. Retrieved from http://books.google.com/books?hl=en&lr=&id=B9HClB0P6d4C&oi=fnd&pg=PR4&dq=vygotsky&ots=TqL8VceaKt&sig=pI1n6aBfzZhSInk-1L11J0g7iCQ

Laurillard, D. (2008). The pedagogical challenges to collaborative technologies. *International Journal of Computer-Supported Collaborative Learning*, *4*(1), 5–20. doi:10.1007/s11412-008-9056-2

Lumsden, C. J. (1983). Cultural evolution and the devolution of tabula rasa. *Journal of Social and Biological Structures*, *6*(2), 101–114. doi:10.1016/S0140-1750(83)80001-3

McLeod, S. (2007a). Behaviorism. *Simply Psychology*. Retrieved from http://www.simplypsychology.org/behaviorism.html

McLeod, S. (2007b). Lev Vygotsky. *Simply Psychology*. Retrieved from http://www.simplypsychology.org/vygotsky.html

McLeod, S. (2009). Jean Piaget. *Simply Psychology*. Retrieved from http://www.simplypsychology.org/piaget.html

Moran, M., Searman, J., & Tinti-Kane, H. (2012). *How today's higher education faculty use social media.* Pearson Learning Solutions. Retrieved from http://dev.pearsonlearningsolutions.com/assets/downloads/pdfs/pearson-social-media-survey-2012-color.pdf

Rose, R. J. (1995). Genes and human behavior. *Annual Review of Psychology*, *46*(1), 625-654.

Sharples, M. (2005). Learning as conversation: Transforming education in the mobile age. In *Proceedings of conference on seeing, understanding, learning in the mobile age* (pp. 147–152). Retrieved from http://www.socialscience.t-mobile.hu/2005/Sharples_final.pdf

Siemens, G. (2004). *Connectivism: A learning theory for the digital age*. Retrieved from http://www.ingedewaard.net/papers/connectivism/2005_siemens_ALearningTheoryForTheDigitalAge.pdf

Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. *Cambridge Handbook of the Learning Sciences*, *2006*. Retrieved from http://gerrystahl.net/cscl/CSCL_English.htm

Taleb, N. N. (2010). *The black swan: The impact of the highly improbable* [epub] n.p.: Random House Trade Paperbacks. Retrieved from Kobo.com

Von Glasersfeld, E. (1989). Cognition, construction of knowledge, and teaching. *Synthese*, *80*(1), 121–140.