The place of theory in educational technology research

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Research into educational technologies tends to focus on applied phenomena, with the consequence that theoretical concerns can be implicit or invisible. We identify an impatience with theory that is reflected in calls for "pragmatic" approaches, and ask how critical theory is in educational technology research. We contend that notions of theory drawn from naturalistic sciences that inform learning design give rise to a *theory/practice* distinction in which theoretical concerns are subsumed under practical goals, constraining the potential for rich conceptualisations and explanations. We make the case that theory matters in two senses: it has institutional and pedagogical implications for educational outcomes, and it is integral to the practices associated with educational technologies. Further, we claim that the material arrangements in educational technologies are often overlooked, and propose alternatives to this dualistic separation towards a relational theory-practice-researcher nexus.

Keywords: theory, practice, pragmatic, paradigm, positivist, relationality, relational, materiality

Theory matters in educational technologies

There's nothing so practical as good theory. (Lewin, 1952, p. 169)

What is theory? And what makes good theory? And how do theories shape our world? If we use the term "theory" for which infinite definitions abound, we might note that it would seem that theory distinguishes itself from practice, it tends to be relegated to the realm of the abstract – we have phrases such as 'in theory' and 'in practice'. Notions of theories vary across disciplines in their assumptions and predictions about the world: do theories explain or "enact" realities? Theories can be dangerous and wonderful 'things', because theories dwell in and evolve through paradigms. Theories deal in the world of 'how', and their paradigms deal in the world of 'why'. Put simply, theories matter because they shape our inquiries and our world as the world shapes theories.

In this paper we revisit the vexed issue of how educational technologies engage with theory. Much research in this field tends to focus on the design, implementation and evidence of their effects (Bennett & Oliver, 2011). While application is inherent to the way in which we know and work with these technologies, theory has an uncertain presence and plays a contested role (Bennett & Oliver, 2011; Jones & Czerniewicz, 2011; Oliver, 2013; Phillips, Kennedy, & McNaught, 2012). Further, Oliver (2013) echoes this sentiment, saying: "The lack of theorisation noted here suggests a radical taking stock of work in the field may be necessary: the explanations offered by existing research, at least for the last decade, rests on uncritical or oversimplified accounts of technology" (p. 41). This state of affairs is summarised by Maton's (2006) assertion that "it's an open secret that educational research can be theoretically inadequate".

There are several strands contributing to the "open secret" of this state of affairs. As we set out to trace representations of theory in educational technology research, we encounter several historical developments that shape discussion in the field and offer competing representations of theory in educational technology research. This was captured by Czerniewicz's (2010) analysis of the educational technology literature, in which she found distinct theoretical approaches that could be understood as paradigms. In her review of this field, she understands these distinctions not in the sense of Kuhn's serial paradigmatic shifts in worldviews, but as "multi-paradigmatic", between "the human sciences, the learning sciences, the behavioural sciences, the physical sciences and the technological sciences" (p. 524). In our enquiry into educational technologies we have two interests: (i) how concerns with theory in the field are represented, and (ii) whether distinct theoretical orientations (multi-paradigms) are incommensurate, that is, entail competing ontologies and descriptive languages, or whether they enable distinct and multiple perspectives in a shared field of practice. This preliminary investigation mainly responds to (i) above: we analysed a snapshot of two ascilite conferences across the last decade (in line with Oliver's (2013) analysis) to enquire into how theory concerns in educational technology have been represented notionally and descriptively over time.

Theory tracings in educational technologies

A challenge for educational technology practitioners is adapting to rapid changes in a digital landscape and making sense of the multiplicity of digital technologies and their emerging practices. This change process was represented over a timescale by Hedberg and Stevenson (2014), who graphically scoped a "technological change continuum in higher education" (p. 18), starting with the PC era through to mobility and cloud computing. They suggest the need for educators to cultivate "new media literacies" (p. 31) that could articulate these trends. This multiplicity is also reflected theoretically. Of the traditions and strands that inform educational technology research, we identify four that have significantly shaped current debates concerning engagement with theory:

1. **Evidence-based practice:** A movement in the broader field of educational studies is the "push" for an evidence-based or "what works" approach to educational research. Biesta (2007) described how the evidence-based practice movement was adapted from medical to educational research, but that these two fields are not homologous, that is, the contexts for research are dissimilar. Whereas evidence-based practice seeks to gather evidence about the effectiveness of an intervention for a given end (such as in terms of patient health), ends in education contexts are not pre-given. Unlike the receptive patient, students actively "interpret and try to make sense of what they are taught" (p. 8), through a mutual teacher-student endeavour entailing uncertain ends that seeks to make education possible.
2. **Big data:** The recent emergence of "big data" and analytics is a further contributor in which theory has come under suspicion, heralded by Chris Anderson's (2008) proclamation of the "end of theory" suggesting that the emergent results of big data processes produce findings that render theory obsolete. The onset of massive data has bolstered an "anti-theoretical stance" (Jones & Czerniewicz, 2011, p. 175). Developments in learning analytics frame an agenda of educational improvement and quality which potentially overshadows the role of pedagogy and theory, as suggested in the OLT supported learning analytics project (Siemens et al., 2013).
3. **The Instructional Design tradition:** The positivist traditions of psychological theories – behaviourism and cognitivism – informed the development of the instructional design tradition. Bennett and Oliver (2011) traced the origins of this to North America in the 1960s, with the development of automated forms of teaching, or "programmed instruction". They point to the persistence of this objectivist theoretical tradition despite the emergence of research models based on constructivist learning environments.
4. **A focus on design research:** The focus on practical, "use-inspired" design research (e.g. Reeves, Herrington, & Oliver, 2005) advocates for a particular research focus on the design effectiveness of learning technologies that reflects the evidence-based practice program of evaluation of interventions. Bennett and Oliver (2011) point out that this "pragmatic orientation" (p. 180) is visible in other literature in the field, where "[t]heory or even critique remains conspicuously absent".

What is notable in these instances is that theory, where visible, tends to be treated as a separate endeavour from the empirical work of research. Even Phillips et al. (2012), who lucidly articulate the terrain of theory in the field and advocate a "scholarly and pragmatic" approach, reproduce the separation of theory and practice that derives from the natural sciences. We seek to describe an approach to educational technology research from which theory is embedded in practice: a pragmatic orientation that can also enact or make theory visible.

Theory themes and patterns

Since an important strand of the pragmatic design tradition has developed in Australia (point 4 above), we conducted a preliminary activity to identify the extent to which theoretical concerns were visible in a leading forum for educational technology research, namely the ascilite conference. As an initial indicator, we obtained visual snapshots as well as word count frequencies using paper titles from two conferences a decade apart. (This is an initial exploration and in further work we envisage more detailed readings and analysis of abstracts across relevant educational technology journals.) We extend on a previous overview of trends in ascilite conferences over 20 years that was conducted by Sims (2004), who found a thematic shift in the concerns of conference papers: from the particulars of technologies and their production, to issues of pedagogical effectiveness and the participants in learning.

As a starting point, we began with a content analysis, a simple quantitative visual representation through word weightings of conference paper titles for 2013 and 2003, using *Wordle* to generate word clouds (see Williams, Parkes & Davies (2013) for a use of technology that affords different ways to undertake analysis). The word cloud, shown in Figure 1, represents the frequency of the most prevalent words in titles for 2013. Questions to ask of the word clouds are: what are the dominant and larger terms? But perhaps more significantly, what is eclipsed and what is absent? Occurrences of the most frequent words are listed in Table 1.

Figure 1. Word cloud of ascilite 2013 titles

A visual snapshot from the titles for the ascilite conference held in 2003, is shown in Figure 2.

Figure 2. Word cloud of ascilite 2003 titles

Questions raised by the word clouds are: what are the dominant and larger terms? But perhaps more significantly, what is eclipsed and what is absent? Occurrences of the most frequent words are listed in Table 1.

Table 1: Frequencies of title words

Word frequencies	ascilite 2013	ascilite 2003
Total	**1524**	**1094**
Learning/learning/learn	98	49
online	21	32
design(s) (-ers) (-ing)	19	16
technology (-ies)	14	2
mobile	11	0
teach/teachers/teaching	10	18
pedagogy/ical	8	0
space(s)/e-space	6	2
reflect/ive/ion	6	2
e-learning/elearning	5	7
tool	5	7
analytics	4	0
practice	3	4
research	3	2
theory/theories/theoretical	*3*	*1*
conceptions	1	0
critical	0	0

In both title word clouds, "theory" terms do not bear much weight at all. Highest occurrences were for: *learning/Learning/learn*, *online*, *tool*, *design technolog**, *theory/ies/theoretical* (3, 1); lowest frequencies for *practice*, *research*, theor*, and none for *critical*. New emerging terms in the field of educational learning technology in 2013 were *mobile, pedagog** and *analytics*.

The word clouds highlight the relative weight (presence as well as absence) of particular terms at these two ascilite conferences. While the terms *theory* (and its variants) and *research* may have been used within the papers, they are hardly present in the title analysis. Dominant are "pragmatic" terms (for example, *design, technology* and *mobile*, whereas meta-language is less visible (e.g. *reflect**, *conceptions*, *critical*). Our *Wordle* examples seem to continue the trend identified by Sims (2004) of a shift from devices and products to issues of pedagogy, for example, the terms *online* and *tools* reduced their frequency over the ten years. These shifts could be tested with a more systematic thematic analysis over time (e.g see Oliver, 2013). While the urgings in the literature tend to be for the "use-inspired" approach mentioned above, there has been a call to theory in the field in more recent years (cf. Bennett & Oliver, 2011; Jones & Kennedy, 2011; Oliver, 2013; Phillips et al., 2011). Our concern is for a field of learning technology research that is able to critique the presence of theory in a "multi-paradigmatic" field, as analysed by Czerniewicz (2010), rather than be directed towards a particular utilitarian approach – to adopt an "ought" rather than an "is".

Theory makings and beyond

Do the conference title comparisons indicate an orientation to "use-inspired" design research, and one that overshadows a theoretical-inspired orientation using meta-descriptions of learning technologies? This snapshot indicates that this may be the case. With emerging terms and preoccupations in educational technology research, we suggest that the field is struggling to find fresh ways to theorise a dynamic field. Reviews of the literature suggest that the field maintains theoretical discontinuities that reflect paradigms and methodologies that are difficult to reconcile (Jones & Kennedy, 2012) but also that the field is forming new trajectories. For example, Czerniewicz (2010) found the field of educational technology located "two distinct theoretical approaches – constructivism and instructivism – clearly, both based on psychological learning theories" (p. 528). Yet her hope is that the associated paradigms – interpretivism and objectivism – are not incommensurate as practised in this field, through "a commitment to mutual understanding using different approaches" (p. 531).

Nevertheless, Czerniewicz describes a field dominated by human-centred theories that entail the theory/practice distinction, based on a subjective observer separate(d) from the world. An alternative to the dualistic perspective of the researcher is scoped by Goodyear, Carvalho and Dohn (2014) in their description of "relational perspectives" that are founded on tracing the relations between material things and human activity. These approaches attend to the relations in material practices, including objects, places, devices, texts, and procedures, and entail a "constitutive entanglement of the material and the social" (p. 141). Rather than dualistic paradigms that invoke a world "out there", *pre*-formed and awaiting an observer's descriptions and predictions, in a relational paradigm the world is *per*formed and emergent – always co-evolving. Examples of this approach can be found in Al-Mahmood's (2012) account of e-learning, where she shows that contrary to its espoused technology promises, the LMS is multiple in its participants' experiences, "performed through multiple enactments that emerge in various sociomaterial practices." Her argument has practical consequences for learning design and choices.

The relational perspective has practical implications for design and applications that are inherent to educational technologies, and therefore warrants the study of their practices. The place of theory in a relational perspective is to furnish notions of practice that connect social and material activity (Al-Mahmood, 2013; Fenwick, 2012; Hannon, 2013; Goodyear et al., 2014). This sense of practice is described by Hager, Lee and Reich (2012) as "relations among the everyday interactions, routines and material arrangements in particular environments and forms of knowing generally from these" (p. 3). Such a description of situated, embodied and material encounters offers fresh directions for practical and emergent research into educational technologies.

For Lewin (1952), theory is practical and productive, offering new trajectories for practice. We have scoped an alternative to the dualistic theories that are so prevalent in educational technology research, and that confine learning within the individual human domain. Theories themselves need to be conceptually gripping and well-developed. Whilst we recognize that theories "are not universally valuable" (Maton, 2006; also Oliver, 2013) and that the solution is not to merely set up our allegiances to any one approach, but rather we want to suggest a rich multiplicity of approaches that might well offer "competing attempts at offering better explanations".

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