



## **A portrait of evaluation studies of learning technology innovations 2005-2010: Addressing the elephant in the room**

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Much effort has gone into the development of evaluation methods for learning technology. Yet the mantra remains the same; that studies fail to produce reliable evidence to answer important questions about the impact of technology on student learning and behaviour. The authors conducted a meta-analysis of 100 evaluation studies published in two leading learning technology journals from 2005 – 2010. A set of thirteen criteria to critique the articles was derived from the principles of educational design research. This paper discusses findings concerned with the extent to which studies are a) theoretically grounded, b) show evidence of impact on student learning and behaviour and c) potentially transferable to other higher education contexts. The findings resonate with comments in a recent report on Learning with Technology (ALT 2010) that ‘research typically doesn’t address the problem of building an ecology of learning, or treat integration of the innovation as a research issue’ (p.5). The authors are keen to discuss ways to improve the quality of evaluation studies in learning technology for the future. Some recommendations are proposed to stimulate discussion and feedback.

**Keywords:** Evaluation studies, research design, evidence, impact, meta-analysis

### **Introduction**

This paper identifies some of the limitations of common approaches to evaluative research in learning technologies in higher education over the past five years. Prompted by ALT’s response (ALT 2010) to questions about how, and in what circumstances, elearning is effective and particularly what evidence demonstrates this, the authors reviewed 100 articles published between 2005 and 2010 in two leading learning technology journals. We used educational design research (also known as design based research) principles to define a set of criteria to critique the selected articles. The focus of this short paper is on three criteria that explore the extent to which published studies are theoretically grounded, show acceptable evidence of impact and produce findings that are informative and possibly applicable in other educational contexts.

The ALT (2010) report notes that, despite a reasonably large body of knowledge built up over the past decades, and the acknowledged importance of doing so (Bannan-Ritland, 2003), research typically doesn't address the need to build an ecology of learning or consider integration factors. It also notes the impossibility of separating theory from evidence, implying that a body of evidence from research into practice offers an ideal basis for theory generation. However, for some decades researchers in the field of learning technologies have noted the lack of appropriate research design as a problem, (Dick & Dick 1989; Brown 1992; Kelly 2003). While solutions to this issue have been proposed they have not been widely adopted (Barab & Squire 2004).

## Methodology

Two journals were selected to review evaluation studies in the field of learning technologies over the past 5 years - AJET (The Australasian Journal of Educational Technology) and ALT-J (Research in Learning Technology). These two leading educational technology journals are representative of the higher education communities in Australasia and the UK respectively, and include the work of a range of international authors. Both are owned by high profile professional societies (Ascilite and ALT) and include top ranked papers from the organisations' competitive annual conferences, and themed special editions as well as unsolicited articles submitted through the normal editorial process. A process was applied to select evaluation studies that were relevant to this review and criteria were applied to gain a portrait of these studies over the past 5 years or so.

### *Identifying relevant articles*

An initial selection process was applied to a total of 318 articles published across the two journals between 2005 and 2010. Articles were selected for review based on positive responses to the following questions:

- Is the research conducted to evaluate technology-related educational resources, learning designs or the use of technology to solve an educational problem?
- Does the research involve the collection and analysis of data?
- Is the research conducted in a higher education context?

One hundred articles were selected and then subjected to a more in depth review. Criteria for review were drafted and refined following a trial run and cross checking for consistency of application by both researchers. Our preliminary discussion also focused on alignment with the literature describing features of educational design-based research. The final set of criteria reflects the principles of this methodology, which is used as a good practice model for evaluation studies of learning with technology. Thirteen criteria were developed and then applied to the sample. The findings discussed in this paper are based on three criteria as follows:

1. Is theoretical grounding of the educational design concept described?
2. Did the evidence clearly show the impact of the initiative on student learning and teacher behaviours?
3. Were the findings informative for the study and possibly for other [higher education] contexts?

## Findings

The analysis of the 100 articles revealed that the majority featured case studies of research into practice. Less than two thirds described the theoretical grounding of the learning design, and few made any serious attempt to reflect on, or extend theories through the study findings. Claims made around the impact of the technology-related educational resources, learning designs technology solution were sometimes tenuous and as such their generalisation to other higher education contexts was also variable. Results are presented in the sections below.

## Theoretical grounding

According to advocates of educational design based research, such as Collins, Joseph and Bielaczyc (2004), evaluation research should not only aim to refine practice but also to address theoretical questions and issues (p.19). This requires research to be grounded theoretically with a view to testing or extending theory. Our analysis found that 64% of articles fully described a theoretical basis for the innovation, 19% provided a partial description and 16% of articles across the two journals provided minimal or no description at all (see Figure 1).

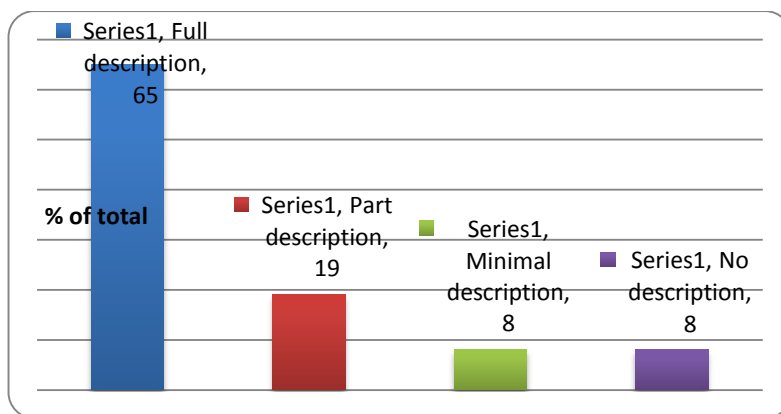


Figure 1: Is theoretical grounding of the educational design concept described?

## Evidence of impact

Over the decades, a significant criticism leveled at research into the use of learning technologies is that there is little evidence that the use of technologies has actually had any significant impact on learning, learner experiences and learning and teaching approaches (e.g., Cuban, 2001; Zemsky & Massy, 2004). The ALT (2010) report points out that ‘a problem with many studies is that they are inevitably conducted in situations where novelty, researcher attention, teacher enthusiasm and special funding may all have a role to play in the enhanced performance or experience of learners and so a significant placebo effect can be present for which a correction is rarely made’ (p.5). Our analysis supports this contention. Only 34% of articles showed a clear impact of the initiative on student learning and teacher behaviours (Figure 3). While 13% presented some evidence, the remaining 53% of articles reported on evaluations where it was too early to show impact, the impact was unclear or based perceptions only or no systematic data collection was described in the study.

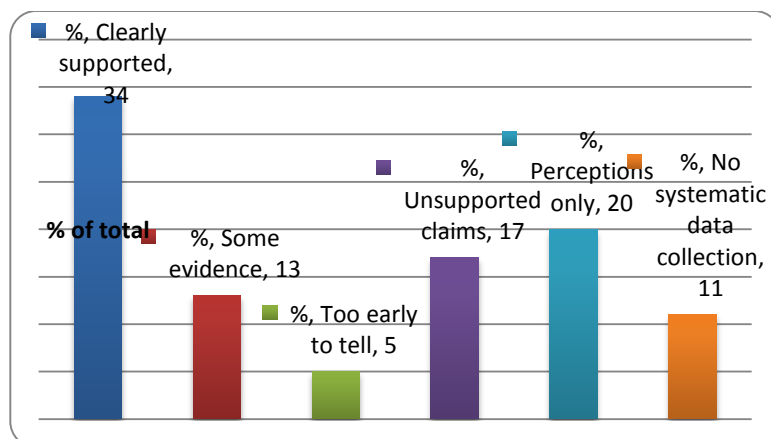


Figure 3: Did the evidence clearly show the impact of the initiative on student learning and teacher behaviours?

## Potential to generalize findings

Educational design researchers are cognisant of the role that context plays in the evaluation of technology supported learning designs. However, at the core of this kind of research is the goal that design principles and guidelines will eventually be produced to form research outcomes that can be generalised to other contexts (Reeves, Herrington & Oliver, 2005). In our analysis, potential for broader application of outcomes could be identified in 64% studies (Figure 4). However, findings were context-specific in 7% of studies and low impact in a further 5%. In 24% of cases, we identified claims that were tenuous or unsupported or otherwise inconclusive.

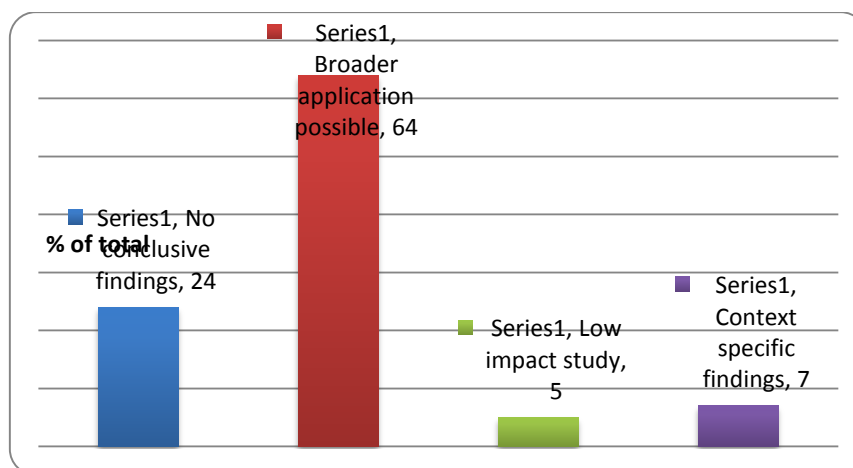


Figure 4: Were the findings informative for the study and possibly for other [higher education] contexts?

## Discussion

From a total of 100 articles, 65 included a description of the theoretical grounding of the learning design, while the remainder provided minimal detail or none at all. Equally concerning was the actual impact on student learning and teacher behaviours. While 34 presented evidence that clearly showed impact, for over 50 it was either too early to tell, based on perceptions only or unsupported through the data collected. Although 64 of studies could apparently be applied to other contexts one would have to question what was worthy of transference? How also do such findings legitimately inform evidence-based practices?

While the results of many studies may be of interest in context, they add little to theoretical understanding or the body of knowledge of learning with technology. Together, these factors highlight a disconnection in the ecology of learning with technology that threatens sustainability of the discipline. The findings reported here concurred with previous studies on this topic (e.g., Brown, 1992; Kelly, 2003; Reeves & McKenney et al., 2010). They also resonate with comments in a recent report on Learning with Technology (ALT 2010) that ‘research typically doesn’t address the problem of building an ecology of learning, and doesn’t take the integration of the innovation into account as a research issue’ (p.5). Factors such as the novelty affect, teacher enthusiasm and enhanced performance need to be taken into account as these dissipate in mainstream application to practice.

## Recommendations: Addressing the elephant in the room

Our findings give cause for concern. This portrait of the state of evaluation studies of technology innovations from 2005 – 2010 clearly shows that there is an elephant in the room in need of address. Further, our elephant

has been present in our field for near half century. Since the 70's the issue that evaluation studies fail to produce reliable evidence about the impact of technology on student learning and teacher behaviour has remained the same. However, in an increasingly mobile and connected society (Andrews and Steel, 2011), the need to understand the impact of learning supported by technologies has never been more critical. A rapidly expanding range of technologies and the pedagogical affordances they offer are influencing university learning and teaching practices more than ever before. Thus, we believe that there is a need to engage our communities in crucial discussion about how we can improve the quality of evaluation studies in learning technology in higher education. We offer, as a starting point, a set of proposed recommendations for discussion and feedback:

**Recommendation 1:** Expectations of high quality evaluation research could be more clearly conveyed to authors through journal submission guidelines and review criteria. These could be explicit enough to ensure that studies situate their inquiry theoretically, collect evidence systematically over time and build on related studies. They might also highlight the need for clear and transparent evidence of impact on learners and teachers and, while acknowledging the contextual aspects of the study, distill the elements that can be generalized to other contexts. At the same time, submission guidelines and review criteria could be carefully crafted so that they are inclusive of different methodological perspectives.

**Recommendation 2:** Reviewers of such articles could be more clearly guided as to what comprises high quality evaluation research and how to give constructive and supportive comments to authors that help them to strengthen their conceptualization of good research design and reporting. This could be achieved by clearer review guidelines and perhaps self-paced reviewer training that helps reviewers benchmark their feedback against exemplar reviewer practices.

**Recommendation 3:**

Societies such as ascilite and ALT could offer a range of flexible professional development activities for researchers and reviewers alike. Such activities could promote benchmarking, explicitly address the elements of research design and reporting that contribute to quality evaluation research, and promote engagement and discussion across our communities around the urgent need to produce reliable evidence to answer to the important questions about the impact of technology on student learning and teacher behaviour.

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**Please cite as:** Steel, C.H. & Gunn, C. (2011). A portrait of evaluation studies of learning technology innovations 2005-2010: Addressing the elephant in the room. In G. Williams, P. Statham, N. Brown & B. Cleland (Eds.), *Changing Demands, Changing Directions. Proceedings ascilite Hobart 2011.* (pp.1178-1183). <https://doi.org/10.14742/apubs.2011.1802>

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