Reviewing the past to imagine the future of elearning

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The conference theme 'learning from the past' invites reflection on educational technology research and development in 30 years since Ascilite began; a period of rapid technology adoption and educational change. Common tools have morphed from static, costly devices requiring qualified programmers to low cost mobile ones that virtually every student in the western world uses daily. The social media 'revolution' is democratizing knowledge creation and sharing. People connect for education, professional and social reasons in ways that were inconceivable in the 1980s. This paper summarizes milestones, and asks how well universities use past experience to understand the present and plan for the future. The wisdom of hindsight is unquestionable, while capacity to predict the future is less certain. Some game changing technologies have come out of left field to knock expectations off the radar. The paper concludes by asking if past experience can really help us prepare for a largely unpredictable future.

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Learning technology research in the 1980s

A review of scholarly articles on learning technology from the 1980s reminded me that there were no online journals then. Retrieving an article required either a hard copy of the relevant publication and a photocopier, or an efficient, but lengthy process to request it through an interloan service, where the two physical items were at the far end of a 'snail mail' service. With my large collection of hard copies long ago consigned to the recycle bin, the website for *Review of Educational Research* offered two immediate options to access the article I sought: a) log in through a subscribing institution to access the article for free, or b) 'pay now' per download. Instant online access to library collections may not have made headline news, but was an important milestone for research productivity. Despite my search being for an article published before most journals were available online, a digitized, full text version in an archive was only a few clicks away. Coupled with the web scale discovery services that Vaughan (2012) describes as 'an evolution, perhaps a revolution, for user information discovery from library collections' this technology has shifted the game in a purely positive direction.

The article in question, *Reconsidering Research on Learning from Media* (Clark 1983), relates to fifty years of research, starting with pictures as a labour saving device in learning (Thorndike, 1912 cited in Clark 1983). It is also the source of a much-cited metaphor about learning media - as it was referred to back then - and a grocery truck; the point being that the type of truck used for delivery has no effect on the nutritional value of the food it conveys. The metaphor doesn't work in every case (e.g. refrigeration), and the conclusion that the type of media used to 'deliver instruction' (also 1980s terminology) has no reliable influence on learning may be taken for granted today. In 1983 it was the outcome of three generations of educational research, mainly in the form of meta-analyses and experimental media comparison studies. The statement 'most studies show that media do not influence learning under any conditions' would have been controversial at the time. It was backed by evidence that studies showing gains from media were 'vulnerable to rival hypotheses concerning uncontrolled effects of

instructional method and novelty.' Any positive effect disappeared when the same instructor applied different methods. In other words, it was the teacher, the content and the teaching methods that made a difference, not the media. Instructional method, now more commonly referred to as learning design, has been acknowledged as the key to success. Novelty effects are off the agenda 30 years on, as the use of various forms of media (technology) in learning has become commonplace. A further claim that 'biased editorial decisions may favour research showing larger effect sizes' begs the question if similar prejudice might exist today (Gunn & Steel 2012).

In this case, the wisdom of hindsight reveals two things, i.e. that earlier studies focused on questions and used research methods considered limited by today's standards. Meta-analyses were a relatively new approach at the time, and experimental methods belonged to a research paradigm used in physical sciences. When researchers realized that all elements apart from media, including content and methods of instruction, must be identical and sample sizes large enough to balance the effects of individual differences for these methods to work, alternatives had to be sought. This was an early stage in the evolution of educational research methods that continues today. The methods were, like most others, imperfect measures that had to be systematically tested so limitations could be identified, and learning technology research could move on with confidence to devise suitable methods to answer more nuanced, emerging questions.

> If five decades of research suggest there are no learning benefits to be gained from employing different media in instruction, what then should studies aim to investigate? (Clark 1983 p 450)

A decade on, the literature showed new directions that learning technology research had moved in. However, the quest for the holy grail, i.e. the 'best' medium or mix of media to deliver instruction, continued. Some researchers believed it was out there waiting to be discovered, while others adopted more pragmatic views.

Fast forward to 1993

By the early 1990s, the discourse of learning technology had expanded and diversified. Issues in focus then included ways hypertext and hypermedia affect learner interaction with content (Lemke 1993); how multimedia provides a gateway to higher order thinking (Fontana 1993); and if constructivism offers a basis for instructional systems design (Lebow 1993). The fundamental nature of teaching and learning was shifting (Swan & Mitrani 1993) along with the language used to describe it. Laurillard (1993) published the first edition of her seminal work, *Rethinking University Teaching: A Framework for the Effective use of Technology*. Action research was an emergent approach to the systematic improvement of teaching and learning, with or without technology. A raft of qualitative and mixed methods had been added to quantitative and comparative research designs (Robson 1993). Student generated resources (Ryan 1993) and authentic tasks (Honebein et al 1993) were developing as core concepts in instructional design.

While Cobb (1997) and many others argued that computers made no significant difference to learning, Swan & Mitrani (1993) produced evidence that their use could change the nature of teaching and learning at its most basic level, i.e. in interactions between students and teachers. They predicted that the use of computers would lead to more student-centered and cooperative schools, and classrooms where learning is more individualized. Dede, Fontana & White (1993) outlined the nature of the change, noting that multimedia systems could foster a model of teaching and learning with learner driven creation of knowledge through a process of formal enquiry. They proposed using features of the available media to develop metacognitive skill in learners. Metacognitive skills and learning styles were prominent terms. Some instructional designers tried to identify individual styles and direct students to versions of courseware suited to that style. This early attempt to develop recommender systems hit a snag when research showed that learning style is not a fixed attribute, but one that varies in the same student according to influences such as teaching strategy and study context. A parallel can be drawn between learning styles research and studies on learning from media ten years before, i.e. the concept had to be explored before its potential and limitations could be fully understood.

The decade between 1983 and 1993 was more eventful than the previous five decades of research in learning from media. Researchers no longer counted the number of computers in schools, but took for granted that access was available. As a point of historic note, American public schools had 1 computer for every 25 students in 1993. Like the novelty effect of technology in the classroom, the value of counting machines was overtaken by more pressing issues. One such issue was the option to publish in electronic rather than print journals, as an extract from a conversation on the American Educational Research Association mailing list relates:

> > Gene: what has been your experience with your electronic journal, especially regarding publication credit?

> Brian: too soon to tell, but people are leery to be sure… who knows what some nit-picking, hide-bound committee of mediocrities might haul off and do with one's tenure application. I find older people with established reputations are more willing to publish in the electronic medium.

The caution around a fundamental shift in the high stakes activity of publishing was understandable. With hindsight, economic and access considerations won through, and online journals have become the norm. What was not anticipated is the economic twist of open access journals charging authors to put their articles through a peer review process and make them available online. The cynics among us wonder if this is simply an attempt to retain profits from institutions whose employees assign intellectual property rights to a third party, who then sells it back to them at considerable cost! There are, of course, many more positive aspects to online publishing.

Lessons learned with hindsight from the 1990s are that synergies between technology and emergent pedagogies did indeed begin to change the nature of teaching and learning at its most basic level. However, the shift didn't occur in isolation any more than the effects of particular media on learning could be isolated and measured. Changing institutional circumstances, increased size and diversity in classes, and evolving understanding of learning combined to drive developments in the use of technology for learning. The affordances of technology are recognized as a powerful enabling force, without which many developments could not have evolved. In the decade to 1993, work to improve reliability, usability and human computer interaction design was prioritized. The benefits of this are evident in the intuitive style and ease of use of the current generation of elearning tools.

Computers in learning in 2003

Another decade on, the issues in focus were broader and more diverse. The potential of computer-mediated communication for learning had been theorized and endorsed (Benseman 2000); the issue of gender inequality in online learning identified as a function of culture (Gunn et al 2003). Progress on computer-aided assessment tools and strategies was a productive response to the pressure of scale and diversity in classes (Sangster 2003). Design-based research was emerging to fill gaps left by experimental, case study and action research methods (van den Akker et al 2006). This milestone in learning technology research introduced theoretical grounding of learning designs and ended research cycles with reflection on generalization. The method supports naturalistic inquiry to explore authentic learning contexts, but adds two key elements that were missing from many case studies published in the 2000s, i.e. explicit theoretical grounding of designs and attempts to generalize findings.

Investment in technology had become a major budget item for universities. A momentary distraction occurred when a sector recovering from the 'Y2K bug' and a rash of failed online-for-profit universities got excited about a 'learning object economy', which promised to generate repositories of reusable content in various forms. The idea was great in principle, but failed to fly, most probably because learning objects were neither adaptable nor easily accessible (Gunn et al 2005). Another possibility is that no one was ready to release their best resources into the public domain. The rise of open content and an open education movement was still a few years in the future. Another emergent issue was the use of online learning management systems (LMS) (Morgan 2003). Hindsight shows these systems are more useful for course administration than learning design. Calls for more flexible and sophisticated technology with better content management and groupware functions have yet to be answered. Rapidly rising price tags noted in the early years have, however, continued their upward trend!

A topic that resurfaced at this point was the challenge of sustaining innovative elearning systems and practices (Wiles & Littlejohn 2003). It was noted early on that only a small percentage of academics and courses were involved in elearning in meaningful ways (Darby 1992), and that initiatives supported by grant funding stalled when dedicated resources ran out (Harvard 2003). The mantra that elearning fails to enter the mainstream is still common today and the challenge to sustain grass roots innovations persists (Gunn 2010). The process of operationalizing innovations is slow, and institutions continue to play little or no active part in it.

Conclusions – 2013 and beyond

If it took five decades of comparative studies to realize that medium was being confounded with method of instruction, what might be the sticking points of learning technology research today? It must have been exciting to believe that media attributes could produce unique cognitive skills. The truth was disappointing; that media elements such as animation or simulation facilitate learning in some circumstances, but are neither necessary conditions nor guaranteed to work in all cases. This echoes the findings of research in various other areas of elearning over the past 30 years, and more will no doubt be added in future. A positive outcome is that some technologies do gain traction, if not always in the ways that were anticipated. End users often find purposes for

tools that developers never imagined. Lecture recording is a good example, where potential was underestimated for students who find recordings useful for a range of purposes, and overestimated for faculty who feared being replaced by recordings. In fact, attendance at live lectures has increased in some cases, while recordings allow more time to engage with students in others. MOOCs are the latest major development with an uncertain future and unexpected benefits already emerging, e.g. access to quality resources for use in other courses. Predictions about a structural shift in the higher education sector may yet be realized. A down side of the commodification of higher education over the past 30 years is the falling value of degree certificates and concurrent rise of applied knowledge and skills, regardless of where they were acquired and how they are accredited.
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This brief overview of 30 years of learning technology research and development reveals topics that have faded from view, as well as others that remain part of the evolving discourse. In the past decade, virtual worlds, social media, blended learning, eportfolios, social networks and strategies to disseminate innovations and engage more people in their use have contributed to the university elearning experience with varying degrees of success. Digital literacy, pedagogy for a digital age and pedagogy 2.0 are current terms; student generated resources, peer assessment and new forms of technology enabled collaborative learning are at the leading edge. Rather than becoming redundant as 'prophets' at the turn of the 21st century foretold, universities are adopting new technologies and adapting to changing circumstances in interesting and suitably cautious ways. The evolution of research methods for the field of learning technology continues to provide a strong evidence-base for knowledge in the discipline, including great ideas that crashed as well as ones that continue to fly.

A less desirable element that seems to persist is the ability of large advertizing budgets and slick sales pitches to set unrealistic expectations and sell untried technology tools to institutes of learning. The affordances of some tools will no doubt prove transformational, but the speed and eventual impact will fall short of expectations. The belief that all of them will transform practice has repeatedly been exposed as unrealistic, electronic whiteboards and Second Life being recent cases in point.

Another thing that hasn't changed much in 30 years is the sector's inability to learn from the past. Perhaps the principle of learning from experience means that every path has to be followed to the point of realization that it isn't actually leading anywhere. If we take findings of earlier research for granted today, and acknowledge the journey it took to get here, what will researchers take for granted in 2043 that the sector is grappling with today? One can only wonder what will seem quaint or even slightly ridiculous about the major issues of today?

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