A caution about causation

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Educational technology research, like all education research, is dominated by explicit or implicit claims of causation. It would be unusual for a research paper in this journal or any other to not draw implications founded on assumed causation within the data. The dominance of cause-effect models in research is not surprising, and for many it is unnoticed and unquestioned. Indeed, Gorard (2002) noted that "cause–effect provides a powerful, persuasive and near-universal explanation for social and psychological processes", however he also warns that this is true "despite our inability to detect it directly" (p.51).

The assumption that we can identify causation, and moreover, claim inferences of future probability, should be given some consideration. The 18th Century philosopher David Hume questioned the basis of making causal arguments (Hume, 1739). He noted that while we may directly experience two events and, using our senses and powers of reasoning, we may draw a connection between them. However, any conclusions about causation, or that similar conditions may result in similar outcomes in the future, are a matter of inductive inference. They are not a 'matter of fact'. Mere association of events does not mean that one necessarily caused the other. However, Gorard (2002) points out educational researchers are, by dint of their remit, committed to cause-effect models.

Cause-effect models are made particularly difficult to establish in educational research, not least because of the growing understanding of the complex influences of social, psychological, technical, cultural and other contexts. Morrison (2009) points out that researchers can quickly find themselves immobilised by a "quagmire of uncertainty, multiplicity of considerations, and unsureness of the relations between causes and effects" (p.4). Indeed, there are many variables to take into account, for example, the educator's pedagogical and content knowledge, the policy environment, technology affordances, and learner agency. With regards to the latter, learners are not homogeneous, and yet the process of educational research necessarily reduces learners to a handful of variables or characteristics. However, the individual and her/his differences, including beliefs, motivation and emotion are well-known modifiers in causation (Maxwell, 2004). Regardless of the cause-effect model being applied or the methodology in measuring it, Gorard (2002) concludes that we are unable to detect cause-effect directly. It is in this context that we need to be cautious in our interpretations of educational technology interventions and their implications for the future.

Texts on educational research methodology often advise caution about assuming that associations, such as in correlational techniques, demonstrate causal links. Despite this, as Gorard (2002) points out, the field is saturated with causal claims based on association. However, this then leaves us with a fundamental question: If we cannot be sure in our claims of causation how should we present our research? Inevitably our task is to engage in a rigorous method of study in which we question the nature of the data, methods, and conclusions to offer the readers our inferences while also allowing for alternative formulations. Claims of causation are unlikely to decrease in the face of the increasing calls for "evidence-based" policy and practice. With this in mind it is even more important to consider how we can resist deterministic or mechanical claims of cause and effect.

This dilemma should not stop our drive for evidence based approaches, but it is a reminder that we need to take care in the rigour of our research, and equally, in the way we describe it. There is a growing body of work examining and providing procedures for drawing causation and generalization inferences from the data. However, there is also a place for deep understanding of unique rich cases. Generalisability is

only one step in the research process. The nature of the research is linked with the goal, and there is need to be cautious of the extent one can, or should, try to claim generalisability. For instance, we see a continuing over-statement of conclusions from single site studies, whereas forty years ago Kennedy (1979) pointed out "Whether or not statistics are used, inferences of generalization are always tentative. Data might offer confirming or disconfirming evidence, but never conclusive evidence" (Kennedy, 1979, p. 664). In response to authors such as Gorard and Kennedy we might call for strengthening claims with more deliberate approaches to reproducible and triangulatory research and those across multiple sites and disciplines. However, despite the relatively recent increase in calls for randomised control trials it has been shown that despite the rigor, these studies are often confounded by the sheer diversity of variables within the 'wild' of real teaching and learning contexts. With this discussion in mind, it is valuable to remember that the strength of causality is not the only factor we need to pursue. Without doubt there is a role for single site studies and small case qualitative work. Sometimes the purpose of research is not to establish generalisability but to generate potentially fruitful lines of inquiry for future research.

There are no answers here. Our intent is to provide a point of reflection. We do not question the value or goals of research in educational technology. No matter the focus or methodology, this research field is motivated by trying to understand the relationship between education and technology, and its implications. In other words, whether we are trying to find generalisability or trying to conceptualise a single case, we believe there is always an imperative to consider, and communicate, the basis of our claims.

In this issue

This issue includes a diverse range of papers in focus, methodology and implications. It is particularly exciting to see a paper by **Terry Judd** on *The rise and fall (?) of the digital natives.* As Terry points out, the dominance of discourse around digital natives has thankfully waned, there is a concern that the conception of generational differences persist and has implications for our understanding of technology use and pedagogical designs in universities.

Several papers in this issue investigate student experience. **Matthew Bailey, Maree Gosper, Dirk Ifenthaler, Cheryl Ware,** and **Mandy Kretzschema** investigate the influences on student decision making around enrolling in on-campus, distance or online modes. They noted that significant difference between the groups with logistics and the teaching and learning to be the most influential in decision making. The experience of teaching and learning in online learning is a particular focus of **Nadine de Metz** and **Adele Bezuidenhout** who explore the roles and competencies of e-tutors. They point out that tutors in online courses are strategically important for the perceived quality and attractiveness of the university, however, they can also be a vulnerable link in the university's educational chain.

Taking a different look at student experience, **Laurie Chapin** explores the relationship between students' use of web-based lecture recordings and their lecture attendance and academic performance. Interestingly, in this study, no differences in final grades were found based on higher/lower lecture attendance or higher/lower access of lecture recordings. One conclusion that is offered is that this may support notions of flexible learning. In terms of lecture experience **Julie-Anne Carroll, Mangalam Sankupellay, Michelle Newcomb, Jess Rodgers** and **Roger Cook** investigate how a student response system may improve learning experiences and outcomes. Taking a different approach **Kelli Nicola-Richmond** and **Valerie Watchorn** consider the use of simulated case studies in offering authentic learning and how it may promote development of key graduate attributes.

Three of the papers in this issue take a closer look at teacher education, with various foci of the teacher-educators, to the pre-service teachers to their transition into service. **Ksan Rubadeau** looks at the internal and external forces on technology uses among English language teacher educators. In contrast **Yuan-Hsuan Lee** focuses on pre-service teachers, particularly, their Internet-based epistemic beliefs, engagement in online activities, and intention for constructivist ICT integration. The third paper considers the complex issue of transition from pre-service to in-service. **Nick Kelly, Nick Russell, Steven Kickbusch, Alistair Barros, Les Dawes,** and **Rune Rasmussen** describe a design-based research study which an online platform for teachers to transition from university into service. It asks how online

communities of teachers can support the development of situational knowledge and describes the major design challenge in supporting trust and stability within large networks.

Two of the papers in this issue focus on the use of social media in higher education. **Enilda Romero-Hall, Royce Kimmons** and **George Veletsianos** investigate the use of Twitter by instructional design departments. They found that social media functioned as a medium for filtering of information relevant to the field rather than conversational hubs. These findings are perhaps not surprising given the sensitivities around the use of social media in higher education as found in the article by **Julie Willems, Chie Adachi, Francesca Bussey, Iain Doherty,** and **Henk Huijser.**

There is an increasing interest in the measurement and interpretation of publication practices. In this issue **Melissa Bond** provides an evaluation and content analysis of AJET with a focus on helping doctoral students "crack the publication code." Melissa considers the journal in terms of rigour, impact, and prestige, and applies an interesting use of computer-assisted content analysis. Overall Melissa offers us some interesting challenges in furthering our reach but also how we as editors and as a journal community can support PhD student publication.

Acknowledgements

The production of AJET is a large team effort. The lead editors Associate Professor Eva Heinrich, Associate Professor Michael Henderson, and Associate Professor Petrea Redmond work with a committed team of associate editors who facilitate the reviews and author revisions of papers.

This year we sadly farewell some of our most senior Associate Editors: A/Prof Helen Farley, A/Prof Shirley Agostinho and A/Prof Chwee Beng Lee. Helen and Shirley have served the journal as Associate Editors since 2013. We also say farewell to Chwee Beng Lee who has been involved as both Lead or Associate Editor since 2015. Their contributions are remarkable and they have each strengthened the journal in so many ways.

We are also excited to welcome seven new Associate Editors: Dr. Eamon Costello, Dr Christopher E Dann, A/Prof Teresa S Foulger, Dr Henk Huijser, A/Prof Matthew Kearney, Dr Chien-Ching Lee, and Dr Kate Thompson. The growth of our Associate Editor team will allow us to maintain our enviable turn-around times on manuscripts and further engage in strategic initiatives.

In 2018 our full team of Associate Editors:

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Backing up the editorial team we have two dedicated copyeditors, Kayleen Wood and Antonina Petrolito who work closely with authors to enhance the quality of the articles by ensuring the text is concise, consistent and accurate. We also thank our large number of expert reviewers who ensure our articles are of

high standard. And finally, thank you to the authors, who offer valuable new understandings in the field of educational technology.

References

Gorard, S. (2002). The role of causal models in evidence-informed policy making and practice. *Evaluation & Research in Education*, 16(1), 51-65.

Hume, D. (1739). *A Treatise of Human Nature.* Oxford: Oxford University Press.

Kennedy, M. (1979). *Generalizing from single case studies. Evaluation Quarterly, 3*(4), 661-678.

Maxwell, J. (2004). Causal Explanation, Qualitative Research, and Scientific Inquiry in Education. *Educational Researcher*, 33(2), pp. 3-11. https://www.jstor.org/stable/3699970

Morrison, K. (2009). *Causation in educational research*. Routledge: London.