ASCILITE
SHAPING THE FUTURE OF TERTIARY EDUCATION
Show Me The Learning
Adelaide, Nov 27-30, 2016

Straddling the technology adoption chasm in university teaching practice using Multi-Mediator Modelling

Irena White
School of Education
Flinders University

This poster presentation demonstrates how a computer simulation can be applied to examine the problem of spreading the adoption of elearning innovations that originate 'bottom-up' in higher education teaching practice. The computer simulation used in this doctoral study allows enabling and inhibiting links to be drawn between factors in 'bottom-up' technology adoption. These factors have been identified from case studies of 'bottom-up' elearning adoption found in the research literature. The resulting computer model provides an interactive view across a whole university system of stakeholder relationships between university management, central support services, elearning innovators and elearning adopters involved in university teaching. The poster provides an explanation of how the computer modelling process works when different stakeholder experiences and perspectives are applied to connect the factors in the model. The application of a computer simulation in interviews for this study addresses the limitations of case study research methods to examine this problem.

Keywords: elearning, innovation, diffusion, sustainability, technology adoption, modelling

The diffusion of elearning innovations

The failure to gain mainstream adoption of elearning innovations that originate in university teaching practice is well documented in university case studies from around the world. The point where a failure in the diffusion of technology innovations occurs is commonly described using the metaphor of a *chasm* (Moore, 1999) that occurs between technology enthusiasts and visionaries, on one side, and the mainstream of a population on the other side (Pacansky-Brock, 2015). Rogers (2003), in his seminal Diffusion of Innovations Theory, segments these groups into *innovators*, *early adopters*, *early majority*, *late majority* and *laggards*, as illustrated in Figure1.

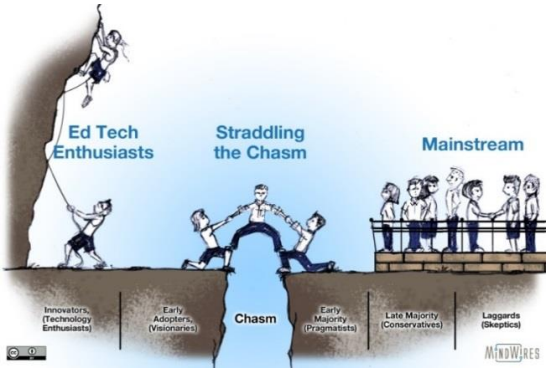

Figure 1. Straddling the Chasm. Retrieved from http://mfeldstein.com/ posted by P. Hill (2015, March 13) and licensed under a Creative Commons Attribution 3.0 Unported Licence.

The study, presented in this poster session, demonstrates how universities can develop insights into how to straddle this chasm by using a Multi-Mediator Modelling computer simulation. This computer model allows interview participants in the study to link the factors and actors involved in their experience with the diffusion of elearning innovations that originate in university teaching practice.

Multi-Mediator Modelling

Multi-Mediator Modelling (MMM) offers a new way of gaining insights into the dynamic, complex and often competing relationships, values and attitudes experienced today by university staff when adopting new technologies. MMM assists in simulating this dynamic and complex environment. The coding and concepts behind the MMM computer simulation have been developed by Professor James (Jim) Levin at the University of California San Diego (UCSD) Department of Education Studies (Levin, 2015). MMM originates from Agent Based Modelling (ABM) which has been described as a "third way of doing science" (Axelrod, 2005, p. 1) that extends traditional social science research methods commonly used in educational research. ABM is a research method derived from the emerging field of the complexity sciences. Jacobson (2015) suggests that "the use of computer modelling, particularly ABMs, can provide research and policy insights about complex educational systems" (p. 310) and concludes that using computer modelling "can provide analytics and information that goes beyond traditional quantitative and qualitative educational research approaches" (Jacobson, 2015, p. 310).

Applying this method in a doctoral study allows an exploration of the connections between the factors associated with different actor, or stakeholder, roles involved in technology adoption within the complex environment of a university ecosystem. The poster session explains how an MMM computer simulation is applied in this study using an example from a pilot study shown below in Figure 1. This example is from a prototype MMM computer simulation used in interview trials for a pilot study and the findings will not contribute to the final research data collected for this doctoral study.

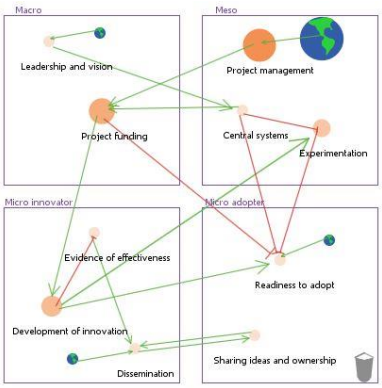

Figure 1. Connected actors, factors and levels of influence

The factors in the above example were drawn from a preliminary analysis of extant case studies conducted by Gunn and Herrick (2012). Factors in the model are represented by the labelled orange dots; influences on factors are shown by globe icons; green arrows show enabling relationships; red lines indicate inhibiting relationships, and the whole model is contained within the four stakeholder quadrants representing actors from university management (Macro) and central support services (Meso) at the top and the (Micro) actors below who are the innovators and adopters involved directly in university teaching.

Jacobson (2015) proposes that using a computer modelling method, such as MMM allows a "simplicity-complexity epistemic view" (p. 311) of complex systems. This allows researchers and interview participants to look for patterns of interactions based on simple rules rather than seeking complex explanations for complex behaviours. It is anticipated that this approach will be of value to universities and other education providers who are seeking to straddle the technology adoption chasm and who want to know "***What do we need to change***?" .

References.

Axelrod, R. (2005). Advancing the art of simulation in the social sciences. In J.-P. Rennard (Ed.), *Handbook of Research on Nature Inspired Computing for Economy and Management* (pp.1-13). Hershey, PA: Idea Group.

Gunn, C., & Herrick, R. (2012). *Sustaining eLearning innovations: A research study report*. Auckland: The University of Auckland Centre for Academic Development. Jacobson, M. J. (2015). Education as a complex system: Implications for educational research and policy. In B. A. Furtado, P. A. M. Sakowski, & M. H. Tóvolli (Eds.), *Modeling Complex Systems for Public Policies* (pp. 301-316). Brasilia, Brazil: IPEA.

Levin, J. (2015). *Creating and evaluating multi-agent models of learning with qualitative and quantitative data*. San Diego: Department of Education Studies University of California, San Diego. Retrieved from https://docs.google.com/document/d/15mJloMh4sZ_CGnEYjMYHLjoTc6tXhbQyE75A4EqjlXc/edit?pli=1

Moore, G. A. (1999). *Crossing the chasm: Marketing and selling high-tech products to mainstream customers.* New York: Harper Business.

Pacansky-Brock, M. (2015, September 23). *Straddling the chasm: Rethinking faculty support*. Retrieved from http://www.teachingwithoutwalls.com/2015/09/straddling-chasm-rethinking-faculty.html

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: The Free Press.

Please cite as: White, I. (2016). Straddling the technology adoption chasm in university teaching practice using Multi-Mediator Modelling. In S. Barker, S. Dawson, A. Pardo, & C. Colvin (Eds.), *Show Me The Learning*. *Proceedings ASCILITE 2016 Adelaide* (pp. 630-632). https:/doi.org/10.14742/apubs.2016.881

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