

## Failing forward in research around technology enhanced learning

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There are lessons to be learned from undertaking ‘successful’ research, but we do not hear much about the lessons learned when your research doesn’t come-off. But in many cases there are some very important lessons that can be learned that others may benefit from, particularly for those who are new to research around the scholarship of teaching and learning (SoTL), as opposed to discipline based research that is ‘reputedly’ conducted from a more empirical perspective. This paper reports on some of the lessons learned by two researchers from two universities on research that could have been done better in relation to technology enhanced learning (TEL). Why do we need to hear about these lessons? For the sake of our students; we want to improve our teaching and don’t want to make the same mistakes that others may have done.

Keywords: Technology enhanced learning, SkillBox, Scholarship of teaching and learning.

### Introduction

To begin with a popularist quote, Bill Gates, the founder of Microsoft, once said "It's fine to celebrate success, but it is more important to heed the lessons of failure." (cited in Brown, 2014). This is as true in educational research as it is in business and science. It’s great to celebrate the research that has worked, that has provided a clear way forward for those investigating certain phenomena, but equally, it can be just as helpful to learn how not to do things, or to learn that a particular intervention does not work. Why? So we don’t all run in and make the same mistakes. Lucy Goodchild (2014) puts it like this:

The academic community has developed a culture that overwhelmingly supports statistically significant, “positive” results. Researchers themselves strive for these results and rush to publish them, leaving the “failed” attempts in the dust. (P. 3)

This is not particularly surprising, but it can skew the way research is perceived by others. As researchers we have a responsibility to report how things don’t work as well as how they do.

The challenge is more than emotional; it’s cognitive, too. Even without meaning to, we all favor evidence that supports our existing beliefs rather than alternative explanations. We also tend to downplay our responsibility and place undue blame on external or situational factors when we fail, only to do the reverse when assessing the failures of others—a psychological trap known as fundamental attribution error. (Edmondson, 2011)

This paper will share two such instances where the research did not go as expected, but where definite lessons were learnt from these ‘failures’. The first case is from some research being conducted at Charles Sturt University (CSU) to assess the success and efficacy of a curated set of multimedia tools (SkillBox) to scaffold particular student skills. The SkillBox instrument itself appears to be successful, but the research around it did not produce the anticipated results. The second case comes from University of Southern Queensland (USQ) where an experiment working with a group of students using two multimodal learning environments did not reap the results that were hypothesized due to some real methodological issues.

The two universities in this paper have many similarities. Both are strong online and distance education providers with a clear focus on learning and teaching. In fact, the two institutions have a higher number of off-campus students than any other Australian University; CSU with 22967, 60.8% of the student body, and USQ with 17284, 72% of the student body (Australian University Rankings 2016). Inevitably this had led both institutions to have a very strong focus on L&T research due to ensuring their off-campus students are receiving an equivalent or, as some have found, better learning experience than other more traditional modes of delivery can provide (Lundberg, Castillo, Dahmani, 2008; Ya Ni, 2013). Similar also in these two universities, we see that although there is significant quantities of research (and scholarship) conducted in relation to teaching and learning (also known as SoTL), this research is perceivably not as highly regarded as some discipline based research, which inevitably increases the pressure of teaching academics to produce research outcomes without necessarily being provided enough time in their workloads to meet these demands. This was highlighted recently in a study conducted by Lanning et.al. (2014), where the authors concluded:

Although the number of journal articles pertaining to SoTL is increasing and the concept is gaining momentum in higher education, both nationally and internationally, it may not be universally accepted or well understood and not valued equally with that of discipline-specific research. (p.1353)

However, as strong teaching institutions, research into learning and teaching needs to be valued as highly as discipline based research. For as we apply systematic approaches to asking questions about one's teaching, designing and using appropriate research methodologies, it is worth recognising that this provides the affordance necessary to elevate our good teaching to appropriate scholarship (Burcham & Shaw, 2010).

## **Two case studies**

### **Researching SkillBox**

In 2014, two academics at CSU identified a gap in provision of resources to students who might be lacking certain knowledge or skills assumed in their subjects. A tool called SkillBox was developed, a set of curated online adaptively scaffolded resources that guide students through a single knowledge area, allowing them to access the resources at their own pace and in their own time (Whitsed and Parker, 2015). Research around the SkillBox concept was encouraged through a CSU Distance Education innovation grant designed to support academic staff in a variety of areas related to online learning. While the SkillBox concept itself was and remains a useful contribution to innovative teaching and learning practices in the online space, it has become clear that the research component has not been as successful as it might have been, for reasons discussed below.

The research was designed to collect quantitative and qualitative data by surveying students before and after using SkillBox, to gauge their change in attitude, knowledge and confidence in the topic area, and to gather feedback on their experience of SkillBox. The first phase of research, in 2015, surveyed students who were provided with a Matrix SkillBox in two small (< 20 enrolments) online graduate subjects, with encouraging results (36% response rate). The second phase of research, in 2016, expanded to hundreds of students using three further SkillBoxes (R, descriptive statistics, and referencing) across eight subjects in two faculties. A number of issues have been discovered in this second phase, which led to very low response rates and in some ways threatened to sabotage the successful outcome of the research project.

The academics involved had no formal social research or SoTL training. Although ethics approval was gained, meaning the research plan was scrutinised to some extent by others, many good practices of social research were unintentionally not followed. For example, the survey was not piloted, some questions that should have been asked, were not, and questions were not necessarily phrased in the best way. This led to a redesign of surveys between research phases, which caused problems with inconsistent analysis.

Technology also proved a barrier. It was important to separate the research surveys from the SkillBox itself, allowing students to opt out of the research but still access the SkillBox itself. A combination of using a separate Blackboard Organisation site, quizzes to determine the students' eligibility to participate, adaptive release functionality and the surveys themselves, resulted in a disproportionate number of clicks needed to access the surveys and then continue with SkillBox. In addition, some students' unfamiliarity with Blackboard may have hindered progress. This resulted in very few students choosing to complete the final survey and contributed to the low overall response rate.

A number of elements could have been implemented to improve the success of this research. Firstly, while academics should be encouraged to undertake research in SoTL, more support is needed in the form of advice and collaboration in the research design and implementation. As with any project, planning and communication are key, and could have been better managed to ensure surveys were implemented at the best time to get maximum engagement. It is important to use technology in a way that encourages participation and provides a positive experience, and again advice and collaboration should be sought well before implementation deadlines. In this case study, SkillBox itself is a valuable innovation, but the research component has potentially made it less accessible to students, highlighting the need to be aware of when to stop researching (in this case, surveying students' knowledge and attitudes before and after intervention with SkillBox) and concentrate on development and championing of the innovation itself (simply providing the tool to students without requiring them participate in additional research surveys).

## **Researching students using multimodal learning environments**

For the University of Southern Queensland multimodal learning is a big thing. It has to be, as most students don't come onto campus. Therefore, research into multimodal learning environments plays fairly high on the priorities of many academic staff. The pressure to perform research is also high, but not necessarily in relation to L&T, which can lead to some activities not being as well thought through, particularly when insufficient workload is allocated. A case in point is a project that was conducted to determine the impact (cause-and-effect relationship) of multiple representations of teaching content on learning outcomes across different learning styles (modal preferences). A quasi-experimental design was selected to allow for groups of students to be exposed to different configurations of study materials and presentation modes and then measurement of students' learning performance. Sixty participants were recruited, allowing for ten each to be placed in six different experimental groups. Participation was voluntary; although a small incentive was offered to encourage participation. Once students had expressed their intention to participate, they were asked to undertake a learning styles inventory. The aim was to include two participants from each of the five learning styles (visual, aural, read/write, kinaesthetic, multimodal) in each of the six groups. Once allocated, students attended the test venue where they undertook a pre-test of the concepts, before exposure to two of six study conditions containing different combinations of materials, ranging from just a Text and Study Guide through to using Text, Study Guide, printed PowerPoint, recorded PowerPoint with audio, and interactive diagrams with script and audio. After exposure to each (2) of the learning scenarios they then completed a post-test and finally completed an online survey about their experience.

At the end of the day this methodology proved to complicate the statistical analysis used in this study, due primarily to the limited number of participants (60) and the limitations of the quasi-experimental methodology. Although there was an improvement in the scores between the pre- and post-test (to be expected) the quantitative data for this study did not necessarily indicate that they performed better because of the presence of multiple representations. However, the qualitative data did indicate that students perceive that the learning resources containing additional representations helped them understand and retain content, and were more interesting and enjoyable to use.

In addition to the small sample size, it was seen that there was a predominance of: higher-achieving students; multimodal learners who typically learn across a range of conditions; and a lack of aural and visual learners in the sample. Given the literature indicates that multimodal learning may be of greater benefit to lower-achieving students, while higher achieving students perform well regardless of how it's presented, this may be one factor that explains the lack of impact of multiple representations of content on learning performance within this experiment.

If this was to be done again it would need to involve a much larger sample, a higher representation of lower-achieving students, and a more even representation across the different learning styles. Future research could also involve more complex concepts to allow for a stronger measure of improvements in learning across the pre- and post-tests. Moreover, the unnatural study conditions (for some) and difficulties in controlling for extraneous factors in a quasi-experimental design should be addressed. Ideally, future research would involve investigating learning performance under more natural study conditions to reduce possible testing effects. The difficulties experienced with the quasi-experimental methodology in this study may provide some explanation for the dearth of empirical data on the impact of multimodal presentation of teaching content on learning styles.

## Discussion – lessons learned

Some common threads can be found in these two case studies. Firstly, the pressure – perceived or real – to be active in SoTL can lead to academics being underprepared and under-supported. Discipline-based academics often lack the theoretical grounding to conduct social research, or this particular type of social research. This can lead them to underestimate the preparation and planning required to complete the research successfully, or lead to experimental designs with insufficient participants. Time (workload), funding and support from SoTL specialists are crucial for academics to develop successful SoTL research programs.

Effective communication was another common theme. Communication between researchers, as well as clearly communicating expectations to participants, is critical, and these two case studies show that when all expectations are not clearly and thoroughly set out, it can be easy to miss collecting valuable data. Cultural barriers can also play in part in the quality of data collected, with the potential for some participants to misinterpret instructions or not fully understand what is expected.

Having realistic expectations, and working out what to do if the data collected does not meet expectations, is another issue identified in both studies. It is important to identify and be honest about limitations in the research. When response rates are low, it can be tempting to make claims that cannot really be substantiated, or to stretch the data past what it shows in reality. Perhaps some of these issues stem from unfamiliarity with social science research, particularly for academics not trained in this discipline.

Troubleshooting and identifying barriers to participation is another important skill to have in this kind of research. In the SkillBox study, technology proved to be a barrier to participation, which could have been overcome with more assistance at the design stages. In addition, it is possible that students are over-surveyed (The Guardian, 2016), making them disinclined to participate in yet another research survey.

Many of the issues identified stem from the fact that social science educational research does not seem to get the same level of support or kudos as discipline-based research - it often does not “evoke the same respect or carry the same weight as traditional scholarship” (Schroeder, 2007). Universities are arguably trying to change this culture, for example making it easier to apply for promotion based on SoTL and teaching excellence. However, there are still some critical questions that need addressing around professional development, support, awards and promotion based on innovations in SoTL (Devlin and McKay, 2016), particularly since there is a particular genre of discourse that many discipline academics are not particularly familiar with (Miller-Young & Yeo, 2015).

## Conclusion

The lessons learned from these two research projects, as seen in the discussion section above, although providing some key lessons of things to avoid while conducting research, also point to the need for institutions to take more seriously their commitment towards the scholarship of learning and teaching. This is particularly important for those institutions who would pride themselves on being good teaching institutions. However, as we have seen, most scholars are trained in research methods associated with their discipline, and there is little training available for these academics if they want to further investigate their teaching of that discipline, that is, undertaking the informed scholarship of their L&T.

Until that is the case what are we left with? We are left with a lot of academics demonstrating an extraordinary amount of good-will because they want to make their teaching practice hit the mark. This will invariably mean some projects will not go as well as others, but that’s OK, if that’s the best we can do for the time being. The important thing is that we need to learn from each other, from the professional communities of practice that exist around the use of technology enhanced learning, not just sharing the wins, but also sharing some of the losses. That’s because:

“Determining what went wrong in a situation has value. But taking that analysis another step and figuring out how to use it to your benefit is the real difference maker when it comes to failing forward. Don’t let your learning lead to knowledge; let your learning lead to action.” (Maxwell, 2000)

The action in this case is better outcomes for our students. So by taking the time to step back and reflect on these two research projects it has allowed these two researchers to critically analyse some of the steps they need to take in the future to ensure better outcomes, but more importantly it has alerted the community of scholars to things to look out for as they pursue the scholarship of learning and teaching.

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