REFLECTIONS ON PRACTICE

SoTL Enquiries In Four Disciplines: Unlocking The Potential Of Interdisciplinary Approaches And Methodologies

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ABSTRACT

Enquiry into discipline-specific student learning is a central element of the Scholarship of Teaching and Learning (SoTL). Discipline-specific teaching and learning approaches have been called 'signature pedagogies' (Shulman, 2005), which raises the question of how applicable and/or relevant such pedagogies are beyond specific disciplines. In this Reflection, we explore a tension within SoTL between discipline-specific approaches and methodologies on the one hand, and approaches that cross disciplines on the other. As part of a Special Interest Group on interdisciplinary SoTL, the authors, who are professionally situated in a range of different disciplines, explore how transferable pedagogies that are used in particular disciplines potentially are. By extension, we reflect on the potential benefit of exploring interdisciplinary approaches via SoTL, and whether they could open up the possibility of cross-fertilisation between different disciplines, and potentially lead to renewal and reinvigorated pedagogical approaches. The planned case studies for our project were based in four disciplines, but each disciplinary enquiry would involve an interdisciplinary approach to the investigation. We conclude in this Reflection that working across different disciplines to develop a common language to explore SoTL projects is a valuable exercise, despite clear challenges, and that it offers much potential for innovative practice, as it forces participants to think outside the disciplinary square.

Keywords: Scholarship of Teaching and Learning (SoTL), interdisciplinarity, signature pedagogies, epistemological habits

INTRODUCTION

Enquiry into discipline-specific student learning is a central element of the Scholarship of Teaching and Learning (SoTL). Hutchings (2010, p. 69) has advocated faculty exploration into classroom practices and the subsequent sharing of what they learn so that others in the community can build on it as a "*sine qua non and prime mover*" in furthering such scholarship, and by extension teaching and learning practice.

In this Reflection, we explore a tension within SoTL between discipline-specific approaches and methodologies on the one hand, and approaches that cross disciplines on the other. For example, some disciplines employ quite specific teaching and learning approaches, which Shulman (2005) has called 'signature pedagogies'. This raises the question of how applicable and/or relevant such pedagogies are beyond specific disciplines. Examples include a design studio approach to design education (Crowther, 2012), inquiry-based instruction in science, technology, engineering, and mathematics (STEM) education (Crippen & Archambault, 2012), or problem-based learning in nursing education (Martyn et al., 2013). As part of a Special Interest Group (SIG) on interdisciplinary SoTL, the authors, who are professionally situated in a range of different disciplines, explore how transferable pedagogies that are used in particular disciplines potentially are. By extension, we reflect on the potential benefit of exploring interdisciplinary approaches via SoTL, and whether they could open up the possibility of cross-fertilisation between different disciplines and potentially lead to renewal and reinvigorated pedagogical approaches.

We employed Miller-Young and Yeo's (2015) methodological and theoretical framework to conceptualise and communicate SoTL (see Figure 1) across different disciplines, and we compared five enquiries or case studies. This was important for three key reasons. Firstly, it addressed the potentially 'narrow' focus of SoTL *within* disciplines. Secondly, it leveraged different sets of disciplinary expertise and approaches. Thirdly, it engaged with both the conceptual and practical barriers to interdisciplinary approaches. Of course, Miller-Young and Yeo's (2015) is by no means the only available framework that we could have used. However, as an interdisciplinary team, we decided in the early stages of our project that it would serve as a good test case to ascertain if it would allow us to reflect in meaningful ways on each of our discipline-based SoTL projects, which are outlined in Table 1. The overall objective was to identify similarities between disciplinary approaches that could be leveraged if interdisciplinary approaches were to be used instead. Miller-Young and Yeo's (2015) framework helped us with the process of conceptualising and communicating potential SoTL projects, and in particular interdisciplinary projects, by providing a conceptual framework to reflect on disciplinary (and/or interdisciplinary) practice.

THE POTENTIAL OF SOTL ACROSS DISCIPLINES

There has been much debate about the nature of systematic observation on the effects of teaching or what constitutes research in the SoTL context (Poole, 2012), especially when such research activities are conducted within specific disciplines. Chick (2013, p. 16) points to the situation in the United States where there is acceptance of only "…a fairly narrow set of approaches in SOTL that limit the methods accepted as sound." These limited perspectives prioritise what Grauerholz and Main (2012) label as fallacies regarding SoTL research, including the need for control groups and for generalisable results, which are seen as identifying features of good SoTL research. However, quantitative approaches of large data sets may not characterise investigations in some disciplinary contexts because other equally relevant methodological approaches, including ethnographic studies or close textual examination yielding qualitative results, may be prioritised and seen as more aligned to the relevant disciplines being investigated. Felten (2013) offers a set of 'principles of good practice in SoTL': 1) inquiry into student learning, 2) grounded in context, 3) methodologically sound, 4) conducted in partnership with students, and 5) appropriately public (p. 121). In particular, that good SoTL practice should be 'grounded in context' is interesting from our perspective, as it

allowed us to focus, for example, on the importance (or otherwise) of disciplinary contexts. It raises the question of whether crossing disciplinary boundaries potentially makes one's approach less 'grounded in context', and what the implications might be.

Poole (2012, p. 139) has argued for an interdisciplinary approach in SoTL enquiry amongst different disciplines, whereby "the sharing of goals and responsibility for outcomes requires a greater consensus around research viability and purpose, and of acceptable roles for the researchers." An interdisciplinary approach to research methodology requires an acceptance and adoption of various disciplines' ways of investigation, where appropriate, to the research questions asked, and of course also of discipline-specific pedagogies. This in itself stimulates reflection on one's own *and* others' practices in the context of specific projects. Poole (2012) provides the example of biologists accepting interview transcripts, think-aloud procedures, and discourse analysis related to student reflections on their learning, while educationists should consider pre- and post-test designs where insights can be drawn from these empirical methods. Adopting an interdisciplinary approach may result in a level of amateurism (p. 140) where there is a dabbling with unfamiliar methodologies. Conversely however, it could be seen as forcing SoTL investigators to share perspectives and research orientations in understanding the dynamics of teaching and learning in their respective disciplines without requiring them to be absolutely well-versed in these new perspectives, which would be an unrealistic expectation. This is a point echoed by Miller-Young et al. (2018), who note that the discomfort many faculty academics experience during their journey into SoTL is sometimes "due to contrasts between SoTL and their discipline's epistemology, as well as challenges to their identity as a teacher, researcher, and a colleague" (p. 1). Interdisciplinary collaborations may help alleviate some of this discomfort, especially when there are different levels of experience in such teams. This further suggests that interdisciplinary SoTL projects offer the promise of partnerships between disciplinary experts and pedagogical experts. This in turn could provide fresh perspectives on discipline-based practice and potential renewal.

DEVELOPING A SYSTEMATIC WAY TO FRAME INTERDISCIPLINARY SOTL PROJECTS

In our discussion, it was felt that interdisciplinary SoTL held promise, but it presents a range of challenges at the same time. For example, Miller-Young and Yeo (2015) depict a potential lack of coherence in the conceptualisation of interdisciplinary SoTL projects, which may seem baffling to new members of the SoTL community. Therefore, there needs to be a systematic manner in which work that transcends disciplinary boundaries can be developed in terms of its theoretical and methodological framing so that the underlining validity is substantiated. They propose a framework of learning theories and methodologies that undergirds SoTL research from and amongst disciplines. Miller-Young and Yeo's (2015) framework was attractive for our purposes because it recognises the interdisciplinary nature of SoTL projects. which may draw on more than one school of thought on learning or different ways of systematic observation, depending on the issue investigated. Figure 1 provides a simplified categorisation of relevant learning theories and methodologies commonly used in education research, as per Miller-Young and Yeo's (2015) framework. It provides some examples of disciplinary enquiries and how they may be mapped to both educational theories (on the vertical axis) and broad methodologies (on the horizontal axis). These examples could be replaced in our case with the five enquiries outlined in Table 1. The framework thus provides a starting point for interdisciplinary discussions around both theory and methodology in SoTL projects.
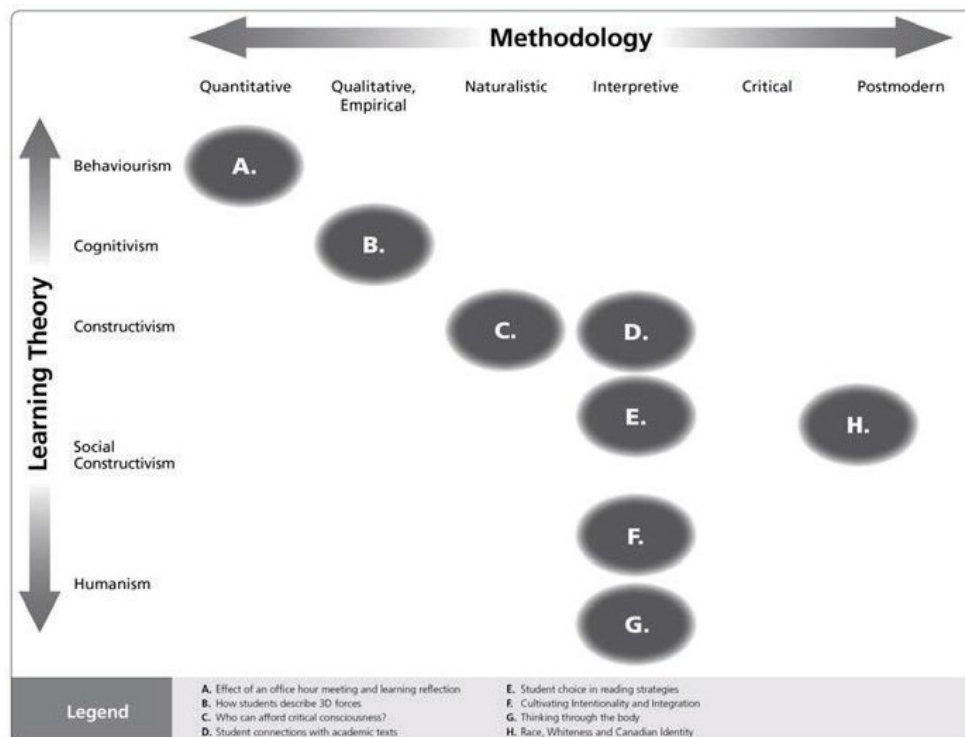
Figure 1. A methodological and theoretical framework to conceptualise and communicate SoTL, illustrated with example studies.

This framework is by no means all-encompassing nor should it be seen as the final word on 'how to do SoTL', and as noted, there are many others. However, it provided us with a common starting point to help with the process of conceptualising and communicating potential SoTL projects, which is particularly useful in the case of interdisciplinary projects involving contributors from different epistemological backgrounds and traditions. This challenge may be further amplified by the perceived 'cost' to faculty of engaging in SoTL, rather than in discipline-based research (Brown et al., 2018). Well-designed interdisciplinary SoTL projects have the potential to count as disciplinary research output, rather than being seen to 'distract' from it.

OVERVIEW OF INTERDISCIPLINARY SOTL PROJECTS

The planned case studies for our project were based in four disciplines but each disciplinary enquiry would involve an interdisciplinary approach to the investigation. The choice and number of enquiries was based on discussions in an SIG on discipline-based SoTL. In a sense then, the choice and number of cases had a level of randomness about it; as noted however, the aim was to explore whether Miller-Young and Yeo's (2015) framework could be usefully applied across different contexts, which required a range of different projects from different disciplinary contexts that could be evaluated and compared. The aim was to explore the viability of using Miller-Young and Yeo's (2015) framework to conceptualise each individual investigation in terms of its underlying theoretical pedagogical approach, and whether it could thereby provide the theoretical grounding that SoTL enquiries are often perceived to lack.

Each of the five planned case studies, except one, were drawn from different disciplinary contexts at the National University of Singapore (NUS), and the topics included applied linguistics (Japanese language learning), applied linguistics (science communication skills), higher order thinking skills in computer science, and use of interactive visualisation tools in mathematics. The exception was based in the Language

Centre of Xi'an Jiaotong-Liverpool University (XJTLU) in China. This particular case study focused on a self-directed language learning tool (Marking Mate) for students, and it was an interdisciplinary collaboration between an educational developer and an English for Academic Purposes expert.

Table 1

Five discipline-based SoTL projects

Project/Case study	Project Aim	Process (based on interdisciplinary discussion and Miller-Young and Yeo's framework)
Enquiry 1a: Applied linguistics (Japanese language learning)	Investigate collaborative learning or cooperative learning through project work in the discipline of language education.	Identify appropriate theoretical framework: *social constructivism*. Identify appropriate methodology: *qualitative/empirical*, *interpretive*
Enquiry 1b: Applied Linguistics (Science communication skills)	Investigate a compulsory academic literacy course for first level undergraduates aimed at developing academic reading and writing skills beyond the considerations of deficit language proficiency.	Identify appropriate theoretical framework: *cognitivism*. Identify appropriate methodology: *quantitative*, *interpretive*
Enquiry 2: Computer Science	Use empirical quantitative methods to evaluate the effectiveness of a course design that incorporated higher order cognitive processes, i.e. apply, analyse, evaluate and create.	Identify appropriate theoretical framework: *cognitivism* Identify appropriate methodology: *quantitative*, *qualitative/empirical*
Enquiry 3: Educational/Academic Development and Curriculum Design, and Linguistics/ English for Academic Purposes	Measure students' learning experience improvements, through the results that *Marking Mate* (an online feedback tool) provided, through a feedback questionnaire, and through a number of follow-up focus groups.	Identify appropriate theoretical framework: *cognitivism*, *social constructivism* Identify appropriate methodology: *quantitative*, *qualitative/empirical*, *interpretive*
Enquiry 4: Mathematics	Investigate the role of interactive visualisation tools in the teaching and learning of linear algebra.	Identify appropriate theoretical framework: *cognitivism*, *behaviourism* Identify appropriate methodology: *quantitative*, *qualitative/empirical*

The SIG provided the opportunity to explore each case study through discussions across disciplinary boundaries. Such discussions included questions across disciplinary boundaries, for example about research design, methodology, and context. This in itself was a useful exercise because it forced the leads of each case study to justify their proposed practice in response to often unexpected questions. In many cases, this process forced a rethink of both theoretical frameworks and methodologies, as such questions may not have been asked if all participants had a similar disciplinary background.

Yet, each case presented particular challenges that interdisciplinary SoTL projects often face, especially in the areas that reflect possible tensions between disciplinary approaches to research and the interdisciplinary approach adopted in the particular SoTL project (Brown et al., 2018). The emphasis in each case study was on how the SoTL project was initially conceptualised with reference to Miller-Young and Yeo's (2015)

framework. Each of these case studies was conceptualised from within disciplinary boundaries. However, these conceptualisations were subsequently subjected to critique and feedback from colleagues with different disciplinary backgrounds, thus creating an interdisciplinary context during the conceptualising phase of each of these case studies. The main challenge was to bring these different case studies together as a coherent whole, to be able to draw conclusions, and develop new insights based on disciplinary boundary crossing.

CONCLUSION

Interdisciplinary collaborations have the potential to enrich SoTL projects as they allow for negotiations and critical and constructive reflections on disciplinary practice (e.g. signature pedagogies) and epistemological 'habits'. In this Reflection, we chose to use one particular framework, Miller-Young and Yeo's (2015) methodological and theoretical framework, to conceptualise and communicate SoTL, and to explore its potential use value. Their framework provided us with a common frame of reference to conceptualise (inter)disciplinary projects and to begin to speak the same language in such projects. By no means do we claim that this is the only framework available, nor that it will fit any context. However, it offered considerable potential to afford productive conversations around the initiation of SoTL projects across different disciplines if used as a reflection tool, which in some cases resulted in a revised methodology for the project (e.g. a qualitative/empirical element added to the conceptualisation of both Enquiry 2 and Enquiry 4).

Further extensions need to be considered carefully, as other forces such as cultural resistance and disciplinary tribalism need to be negotiated before the full potential benefits can be obtained (Fanghanel et al., 2016). Based on our discussions around case studies, working across different disciplines to develop a common language to explore SoTL projects is a valuable exercise, despite clear challenges, and offers much potential for innovative practice, as it forces participants to think outside the disciplinary square. Whether the projects eventually turn into fully interdisciplinary projects may be less important than the projects' benefits derived from interdisciplinary discussions around their conceptualisation. Thus, the process outlined in this Reflection encourages participants to critically reflect on their disciplinary practice, and to justify their practice to interdisciplinary peers, which in turn may enrich their SoTL projects.

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REFERENCES

Brown, K., Scherrer, P., & Suter, R. (2018). Weaving the threads: how SoTL can contribute to a culture that learns. In: *15th Annual Conference of the International Society for the Scholarship of Teaching and Learning (ISSOTL)*. Bergen, 24-27 October.

Chick, N. (2013). Difference, privilege, and power in the scholarship of teaching and learning: The value of humanities SoTL. In K. McKinney (Ed.), *The Scholarship of Teaching and Learning Across the Disciplines* (pp. 15-33). Indiana University Press.

Crippen, K. J. & Archambault, L. (2012). Scaffolded inquiry-based instruction with technology: A signature pedagogy for STEM education. *Computers in the Schools*, *29*(1-2), 157-173. http://dx.DOI/10.1080/07380569.2012.658733

Crowther, P. (2013). Understanding the signature pedagogy of the design studio and the opportunities for its technical enhancement. *Journal of Learning Design*, *6*(3), 18-28. https://files.eric.ed.gov/fulltext/EJ1018589.pdf

Fanghanel, J. Pritchard, J. Potter, J., & Wisker, G. (2016) *Defining and Supporting the Scholarship of Teaching and Learning (SoTL): A sector-wide study*. Literature Review. Higher Education Academy. Retrieved from https://repository.uwl.ac.uk/id/eprint/2066/1/literature_review.pdf.

Felten, P. (2013). Principles of good practice in SoTL. *Teaching & Learning Inquiry*, *1*(1), 121-125. https://files.eric.ed.gov/fulltext/EJ1149965.pdf

Grauerholz, L. & Main, E. (2012) Fallacies of SOTL: Rethinking how we conduct research. In K Mckinney & M T Huber (Eds.) *The Scholarship of Teaching and Learning In and Across the Disciplines* (pp. 152 – 168). Bloomington.

Hutchings, P. (2010). The scholarship of teaching and learning: From idea to integration. *New Directions for Teaching and Learning*, *123*, 63-72. https://doi.org/10.1002/tl.410

Martyn, J., Terwijn, R., Kek, M. Y. C. A. & Huijser, H. (2013). Exploring the relationships between teaching, approaches to learning and critical thinking in a problem-based learning foundation nursing course. *Nurse Education Today*, *34*(5), 829-835. https://doi.org/10.1016/j.nedt.2013.04.023

Miller-Young, J. & Yeo. M. (2015). Conceptualising and communicating SoTL: A framework for the field. *Teaching and Learning Inquiry: The ISSOTL Journal*. *3*(2), pp. 37 – 53. https://files.eric.ed.gov/fulltext/EJ1148477.pdf

Miller-Young, J., Yeo, M., & Manarin, K. (2018). Challenges to disciplinary knowing and identity: Experiences of scholars in a SoTL development program. *International Journal of the Scholarship of Teaching and Learning*, *12*(1), 1-6. http://dx.DOI.org/10.20429/ijsotl.2018.120103

Poole, G. (2012). Square one: What is research?. In K Mckinney & M T Huber (Eds.) *The Scholarship of Teaching and Learning In and Across the Disciplines* (pp. 135–151). Bloomington.

Shulman, L. S. (2005). Signature pedagogies in the professions. *Daedalus*, Summer, 52-59. https://www.jstor.org/stable/20027998 ■