The Value of Me in STEAM: Teacher identity development through STEAM education

by Melissa Silk

Thesis submitted in fulfilment of the requirements for the degree of

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under the supervision of Dr. Kimberley Pressick-Kilborn and Dr. Kirsty Young

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March, 2021

Certificate of Original Authorship

I, Melissa Silk declare that this thesis, is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of International Studies and Education, Faculty of Arts and Social Sciences at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by an Australian Government Research Training Program.

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Abstract

In a profession enmeshed with theoretical, intellectual, and emotional complexities, asking secondary subject specialist educators to teach outside a comfort zone of words, equations, practice and expertise, is risky. This research presents a range of case studies of how teachers took such risks in the context of STEAM education, with a view to reinvigorating and effecting innovative pedagogy integrating science, technology, engineering, the arts, and mathematics. Four case studies were conducted over two years from three schools' professional learning (PL) programs and one professional organisation. The total number of participants was 58, with intensive focus on 14 teachers. Weaving a complex web of interpretation based on the dual framework of phenomenography and social constructivism, the research investigates two questions: (1) How can STEAM education activities be co-designed and delivered to encourage teachers to explore other ways of viewing themselves?; and (2) How does experiencing activity emotions in STEAM projects enhance or detract from the teachers' personal identity development? On the question of effecting teacher transformation, results from mixed methods data collection, including experience sampling, demonstrated the influence of dialectical emotions experienced during STEAM learning. Such emotions encouraged shifts in teachers' self-perception and identity as STEAM challenges were accepted, enacted and overcome. Divergence from solid subject specific knowledge, in the interest of considering pedagogical alternatives to conventional practice, afforded teachers new capabilities related to ways of knowing, being and becoming. Evidence of small and large teacher transformations emerged through the expression and experience of STEAM transdisciplinarity, teachers' activity emotions, and a new sense of teacher purpose related to the impact of STEAM. This gives rise to a key recommendation: that designing STEAM PL expects to encounter a range of teachers unfamiliar with transdisciplinary challenge, but that each type of teacher brings their own value to the learning. To develop a full picture of the value of STEAM for non-generalist teachers, additional studies will be needed to ascertain how authentic transdisciplinary STEAM encourages teachers to view their own knowledge through different lenses, potentially viewing themselves in alternative ways. This study,

however, indicates how a treasury of unique STEAM ideas put into practice *can* be personally and professionally transformative for teachers, even for just a short time.

Figure A.1: Teacher research participants engaging in STEAM learning and teaching.

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