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There and Back Again: An Engineers (Autoethnographic) Tale

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As a factory worker, who became a motor mechanic, an electronics technician, process engineer, university course director, associate dean and more recently a PhD student in education, I have an extremely varied experience of education and lifelong learning. As my research aim was to bring a different perspective to education, I also needed to take a different approach to research. So I began my PhD with a grounded theory style approach, and a reflexive autoethnography of my life of learning. An autoethnography exploring thirty years of my life was bound to uncover many themes, but one that stood out was my experience of a significant disconnect between engineering education and practice. This paper discusses the autoethnographic journey that concluded with me questioning how this disconnect is maintained. I conclude by briefly summarising how intend to explore this question in the latter stages of my PhD.

Tell me a story…

It has been said that autoethnography is about telling stories, connecting the personal to the cultural (Ellis, Adams, & Bochner, 2010). A lot has been written about autoethnography in recent years, so much so that I have questioned whether there have been more papers written *about* autoethnography, than actual autoethnographies. As an engineer, new to social science, one of the biggest problems was that there appeared to be no clear agreement on what autoethnography actually *is*, and according to Denzin (2014, p. 20) the aspirations of leading autoethnographers differ like "Apples and Oranges". I was first attracted to autoethnography through the evocative approach championed by Ellis et al. (2010), and its ability to draw the reader into the world of the other. I read autoethnographies about a female professional golfer tiring of the locker room antics of older male golfers on the pro-am circuit (Douglas & Carless, 2008), and a teacher struggling with the dilemma of applying academic standards to people whose lives are so bad already, that to fail them could seem unthinkable (Wilson,

2011). These evocatively written stories demonstrated a powerful ability to communicate experiences that would have been otherwise impossible for me to understand. However, it was important to me that I didn't just tell a story, but that I connected this to the lives of others, and to academic literature, and the closest match that I could find to this aim was in the Grounded theory based analytical approach proposed by Pace (2012), building on an earlier proposal by Anderson (2006). The approach I have taken combines evocative autoethnography, interviews to gain multiple perspectives (Santoro, 2014), grounded theory approaches to thematic analysis and the literature, and it is my intention to later use a Bourdieusian analysis to explore the key themes. My experience so far, has convinced me that autoethnography has great potential as a key part of a methodology, rather than standing alone.
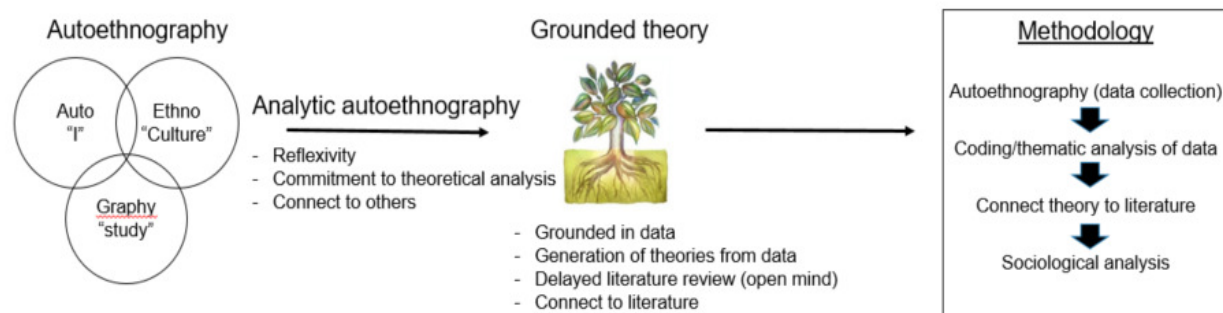

Figure 1: Methodology used in this study

So, I started to write, and when I finally stopped I had produced an autoethnography of lifelong learning spanning nearly thirty years. My story began with a bad experience at the end of primary school, my subsequent disengagement in high school, and culminated in my entry to academia and initial exposure to education as a sociological discipline. However, one of the problems with such a long and broad story was that when it came to analysis, it became very difficult to identify a key theme to explore in the depth required of a PhD. Was the key theme the events at high school that led to my disengagement and disinterest in formal education? Was it the question of why I was not motivated to learn at high school, yet I found the motivation for fairly high levels of academic achievement as an adult? I had recounted how I did the minimum required at school and left with grades well below that required for higher education, although at the same time I was actively learning about things that interested me, mostly from library books. Despite

my recollections of antipathy for high school, barely a year went by after leaving that I wasn't enrolled in a formal educational programme of some form or another. Alternatively, was the key theme my experience as an apprentice motor mechanic? I had written about an exclusively male working environment, but certainly not a privileged one, where unions had been effectively outlawed, working conditions were decades behind other industries, and some apprentices were subjected to punishment/initiation that can only be described as physical/sexual assault. An initial literature review had made it clear that the world I was describing there was completely unexplored in academic literature, and therefore was it a story about social class or hidden lives?

There were clearly many varied themes that I could focus on, but as Denzin has stated "A story told is never the same as a story heard" (2014, p. 55), and I found that the story being reflected back to me through interviews with those who read the autoethnography, and the supervisory process, was quite different from the one that I thought I was writing. I had initially thought I was writing a story that would explore how people learned, or what motivated them to learn, but I started to realise that the story being reflected back to me had a destination in engineering practice. Although the culmination of my story was a career in professional engineering, as a high school student my indifference to mathematics, and my qualitative and creative interests would not have marked me out for a career in this field, and I started to wonder whether I had entered the wrong career. However, as I wrote about the later stages of my career I realised that I had been reasonably successful as an engineer. On reflection, it became apparent that taking a creative or qualitative approach was never a problem during my career as an engineer, only in my engineering education. In my career as a practicing engineer I never used the classical mathematics that I had to spend so much time struggling through in my degree, and I had started to note how my experience of engineering education, was markedly different from my experience of engineering practice.

A disconnect between engineering education and practice

I effectively wrote two autoethnographies, although that wasn't my original intention. The unintentional autoethnography was my methodology which I had only intended to write in an autoethnographic style, but later I realised that this was also autoethnographic data. That turned out to be key because it

captured my epistemological journey from engineering to social science, and it highlighted the epistemological differences between my experiences of the practice of engineering, and the content of engineering education. As I wrote about social science methods and concepts, I noticed how similar some of these were to my experience of engineering. I noted that the vast majority of my experience of engineering practice was subjective and qualitative, while engineering education seems to be almost exclusively objective and quantitative. I wondered about how many potential engineering students were being discouraged by the association with mathematics, when in my experience I never used anything more complex than I had learned in high school.

My initial literature review found that while engineering education was initially based on practice, an *engineering science* paradigm that prioritised mathematics and scientific theory had later risen to dominance (Crawley, Malmqvist, Östlund, Brodeur, & Edström, 2014, p. 3; McMahon, 1984, p. 238). Given the dominance of the "engineering science paradigm of education" (Johnston & King, 2008, p. 76), I had not expected to find very much in the literature to support my argument that engineering practice was largely qualitative and subjective, with minimal use of mathematics. I was surprised to find that similar issues had long since been highlighted by mathematics researchers, such as Kent and Noss who chose to research what they thought would be a "mathematically-rich professional practice", but instead found engineers stating that "'squared' or 'cubed' is the most complex thing you do" (2002, p. 39/1). Other mathematics researchers argued that the level of mathematics that students were being required to obtain for their engineering degree was "completely unnecessary" (Berry & Whitworth, 1989, p. 28) and out of step with the way that engineers use mathematics in practice, and challenged the "mismatch" between the "primacy of mathematical theory" in education and engineering "as practiced in the field" (Gainsburg, 2007, p. 481). The stark contrast between the views of academics and practitioners is evident in an Australian government commissioned report, where "several practising engineers asserted that their university mathematics was a "waste of time", while academics stressed its "absolute importance", 'with the implicit meaning that this competence is necessary for students to succeed in their particular advanced course" (Johnston & King, 2008, p. 76). It seemed that many of the things I had established through my

autoethnography were already known, and I started to ask, why, if this is already known, does it not change?

Where is this going?

I had initially considered the question of why engineering education exists in the form that it does, from the perspective of the arguments made by Shulman (2005) and Haggis (2003). In different ways both these papers had influenced me to think about the potentially cyclic nature of education, where a student who responds to a dominant pedagogy within a discipline, is more likely to later become the educator and repeat that pedagogy. However, the concepts of signature pedagogies and constructing images discussed by Shulman and Haggis seemed insufficient to describe the influence of wider society on education. I started to think about my journey of lifelong learning and how it differed from most of my industrial and academic colleagues and this is represented in figure 2. I was drawn back to the social theory literature that I had explored when, as discussed earlier, I considered that the main theme of my autoethnography might be related to social class. I reconsidered the concept of Habitus, or the "embodied history" (Bourdieu, 1990, p. 56) of an individual, and how my "window to the world" (Zembylas, 2007, p. 447) might differ from others who had entered engineering and engineering academia through more traditional routes. A more complete discussion on Habitus and the related Bourdieusian concepts are beyond the scope of this paper, but the second half of my PhD has become focussed on developing a Bourdieusian framework to analyse the field of engineering education and the disconnect that I have highlighted through my autoethnography.
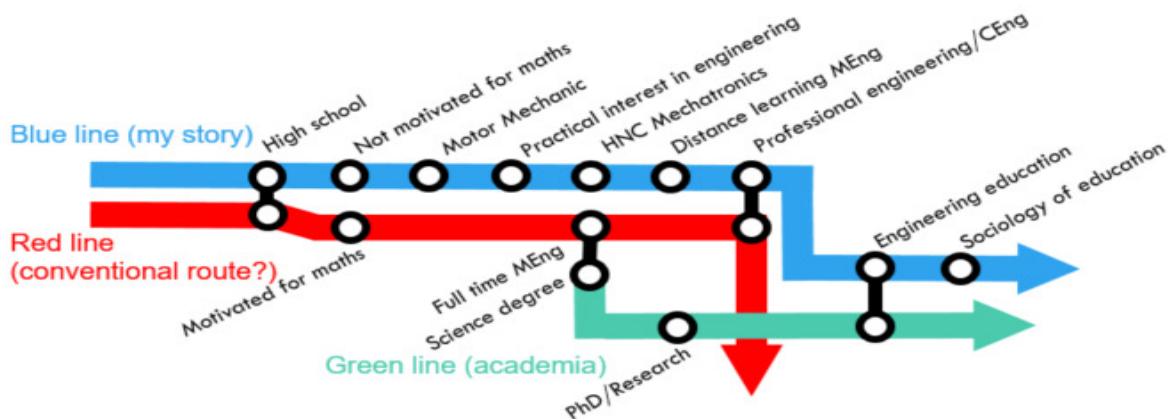

Figure 2: A journey of lifelong learning

Summary

This paper has discussed autoethnography as both a method and a process. I have discussed how taking an autoethnographic approach to capturing both my experience of lifelong learning, and my epistemological journey from engineering to social science, has allowed me to analyse these chapters as data, and view engineering through the lenses of personal experience and epistemology. Although I encountered issues in narrowing the scope from such a broad autoethnography, I would argue that the grounded autoethnographic approach I have taken to both my methodology and data, has raised questions and uncovered themes that might not have been explored in a more conventional study. As for the Bourdieusian analysis, well that's another story…

About the Author

Kenneth Moffat studies at University of Edinburgh, school of education under the supervision of Dr Aileen Kennedy and Dr Gillian Robinson. He is also a Chartered Engineer with the Institute of Engineering and Technology, and a member of staff in the Faculty of Engineering, at the University of Strathclyde.

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