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Divorce, evil, and the regime of terror: personal characterisations of mathematics in the lives of mature students

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Abstract

Increasing numbers of students attending higher education institutions in Ireland take obligatory mathematics modules – service mathematics – as part of their programmes of study. A dislike of mathematics is frequently expressed among students, particularly mature students, some of whom experience mathematics anxiety. However, despite their experiences with mathematics, mature students demonstrate motivation and resilience in respect of their engagement with mathematics. As part of a mixed methods study, the author endeavoured to explore the mathematics experiences of mature students throughout their lives, and to identify those incidents that have impacted significantly on the students' engagement with mathematics. Twenty mature students were asked to characterise their relationship with mathematics. This paper[1] presents these findings, depicting an interesting variety of responses.

Keywords: mature student, service mathematics, mathematics life story, mathematics anxiety

Introduction

Mature students[2] represent a heterogeneous cohort in undergraduate programmes in higher education (Bloomfield & Clews, 1994; Lynch, 1997). Their challenges can be manifold and can differ considerably from 'traditional students' who have completed school and progressed straight to higher

[1] The present paper stems from the author's (Ryan) Ph.D. research into the existence of mathematics anxiety among mature students; the paper also builds on the findings of a previous paper presented at ALM-23 and published in 2017 (Ryan & Fitzmaurice, 2017).

[2] In the Irish context, a mature student is defined as being 23 years or more on January 1st in the year of entry or re-entry to an approved course (www.hea.ie, 2018)

education (Brady, 1997). Returning to education as a mature student can be intimidating, as can the exposure to different teaching and learning methods compared to what mature students would have encountered at school (Hadfield & McNeil, 1994; Chinn, 2017). Service mathematics (Macbean, 2004; Gill & O'Donoghue, 2008) is frequently an obligatory module in undergraduate programmes and may pose a further challenge for the mature student, who may not have associated mathematics as a likely component of their chosen discipline of study (Fitzmaurice et al., 2014).

Some mature students experience mathematics anxiety, defined as "feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations" (Richardson & Suinn, 1972: p.551). However, mature students are highly motivated (Knowles et al., 1998), and any negative issues they have with mathematics are usually dealt with or put aside in order to enable them to engage with mathematics and facilitate progression with their programme of study (Hadfield & McNeil, 1994). In this regard, mature students tend to seek help with mathematics (Fitzmaurice et al., 2014), frequently availing of mathematics support facilities on campus. Behind the scenes, however, some mature students may have experienced a turbulent past with mathematics, that may be responsible for their approach to and level of engagement with the subject in higher education (Hembree, 1990; Tobias, 1993), but which may not be disclosed (Tobias, 1993). To this end the present study endeavoured to uncover the stories behind mature students' experiences with mathematics in order to get a sense of how they feel about the subject as experienced throughout their lives.

The students who participated in this study were asked to share their mathematics life stories (Briggs, 1994; Coben & Thumpston, 1995; Drake, 2006), which culminated in the student giving a theme to their relationship with mathematics. Affording the interviewee the opportunity to consider a personal theme gives them the chance to look back and – in choosing a theme – enhance their understanding of their life story (McAdams, 1993) with reference to the path taken as well as significant events and relationships along that journey (Atkinson, 1998). Thus, as the mathematics life story aims to shed light upon the life course that the student associates with their engagement with mathematics, the personal theme for their relationship with mathematics helps to elucidate how they feel about the subject in the context of their mathematics life story (Atkinson, 1998).

Mixed method research design

With an overarching focus on investigating the existence of mathematics anxiety among mature students studying service mathematics in Ireland, the research design comprised a sequential mixed method approach (Mertens, 2015); phase one was a survey targeting mature students who are studying service mathematics in higher education undergraduate programmes across the University and Institute of Technology[3] sectors; this captured the respondents' scores on the 23-item Mathematics Anxiety Scale U.K. (MAS-UK, Hunt et al., 2011), as well as some biographical data (N = 107). This phase was followed by semi-structured interviews with twenty mature students who opted in from phase one (Ryan & Fitzmaurice, 2017).

To get an insight into the participants' feelings about mathematics, and to elicit the stories of mature students' engagement with mathematics throughout their lives, the interview format used an

[3] An Institute of Technology is a further and higher education institution which focuses on teaching and learning, purpose-driven research and development, business support and incubation, and civic engagement and public service (www.thea.ie, May 2018).

adapted version of McAdams's (1993) Life Story Framework; this framework was deemed fit for purpose as it aims to elicit the stories from different stages of the interviewee's life course – childhood, adolescence, adulthood, future, as well as examining strategies adopted throughout their life to-date, and their overall characterisation of their life experience. This framework aptly paralleled the course of a mature student's typical engagement with mathematics throughout their lives; consequently, the format of the interviews was guided by this structure. Participants were invited to give accounts of their engagement with mathematics at primary school, and post-primary school, as well as mathematics beyond school – either in the workplace or in further engagement with education –, as well as the role of mathematics in their decision to return to education, and the part they see mathematics playing in their future. The framework also provided scope in the interview to examine the strategies the participants had taken to engage with mathematics, as well as the characterisation of mathematics in the form of a personal theme for their relationship with mathematics. It is the responses to this last part of the framework that inspired this paper, with the focus on the characterisation of mathematics by the participants, and the stories behind them in order to illuminate the themes.

Findings

The title of this paper presents three of the themes characterised by the students: divorce, evil and the regime of terror.

Divorce

The first theme – divorce – was presented by Neo, a male student with a low MAS-UK score (29).

> It was like a marriage that broke up and got back together. I took it for granted for a while when I was younger, and then we parted terms and it wasn't amicable. … I had a divorce. And we missed each other, and after a few rendezvous with other areas of my life, we got back together, [and are] looking forward to a bright and prosperous retirement together, so it's onward and upward. (Neo)

Neo dropped out of school at age 15, prior to which he recalls being frustrated with mathematics, as he had lots of questions about mathematics but could not get answers, and the difficulties with mathematics got worse. After school, he worked as a manual labourer on building sites. During this time, he was exposed to engineering decisions, but could not contribute. He returned to higher education after doing a one-year access programme. In higher education he has relied heavily and engaged positively with the mathematics support facility, resulting in a very positive experience with his programme of study in the discipline of engineering.

Evil

The second theme – a necessary evil – was presented by Ken, a male student with a low MAS-UK score (31).

> It's a necessary evil … I'll get to a certain level in maths and that will be it, and I don't think I'll ever be totally comfortable with it. It will always frustrate me, and I'll always be wary of certain aspects of it, because I don't understand it. … A necessary evil: I do it, I do what I can with it, but I'm never going to be a shining star. (Ken)

Ken enjoyed school mathematics, but from fourth year (high school, UK) there was a heavy focus on algebra without obvious relevance. He had over 30 years of a gap since leaving school and entering higher education. Sometimes he cannot follow instructions in class because he cannot understand a concept the first time it is presented. In mathematics examinations, he finds that questions can be vague, and that confuses him. He wonders if that is done deliberately by the lecturer. He focuses on sub-questions with high marks and admits that he struggles with the smaller details.

The regime of terror

The third theme – the regime of terror – was presented by Jon, a male student with a moderate MAS-UK score (59).

> I've developed a liking for numbers, I really have, but in early years my god, … [for most of primary school] I lived under a regime of terror. There was incidents within those years … if you got the slightest thing wrong, you got beat. … And I suppose it wouldn't be fair to say the maths was terrorising me, it was the system terrorised me. And maths is the catalyst, the thing that's causing me all my problems, you know. So I just avoid it. (Jon)

Jon suffered physical abuse at primary school for getting mathematics wrong. He missed six months of first year at secondary school due to illness, and never caught up with the mathematics he missed out on. He has avoided mathematics as much as possible in his life, even though his work before entering higher education involved calculations which he had no problems with. He had already started his degree programme when he realised he would have to do two mathematics modules and considered leaving the programme. However, with the help of the mathematics support centre he tackled the mathematics and succeeded in both modules.

Other themes

The interviews gathered a variety of other personal themes, ranging from positive to negative characterisations, as well as contrasting themes. Positive themes included:

- the universal significance and logic of mathematics;
- the clarity of mathematics (i.e. you get an answer);
- the Eureka moment and sense of illumination that it brings;
- a gel that binds the coursework together;
- a confidence builder.

These themes present a sense of appreciation of the importance of mathematics to the real world, its relevance and our dependence on mathematics. Mathematics is viewed as particular and clear, in that you get an answer. Its presence across modules helps students see the connection of mathematics to the real world and future careers. Proficiency in mathematics lends itself to incremental confidence. The students who presented these themes comprise four males and one female with MAS-UK scores ranging from 29 to 56.

In contrast, some of the more negative themes included:

- Fear and trying to make sense of it;
- Mathematics not liking you;
- Mathematics is not my friend;
- Inaccessibility of mathematics;
- Having to do it to get through;
- Avoid it and do not (want to) embrace it.

These themes contrast with those above and exemplify the challenges these students face in terms of how they feel about mathematics. There are feelings of fear and dislike of mathematics, that mathematics is inaccessible, and that it has to be done to get through the degree programme. The strong sentiment of avoidance and not wanting to embrace mathematics suggests considerable anxiety towards the subject. The students who presented these themes comprise three males and three females and have MAS-UK scores ranging from 48 to 94, a notably higher range than the students presenting positive themes and suggesting that these students typically have higher levels of mathematics anxiety.

Contrasting themes included:

- A love/hate relationship;
- Wonder and frustration;
- A begrudging respect;
- Not giving up despite being mathematics anxious.

These students expressed an appreciation for mathematics, and acknowledged it importance; however, they struggle with the subject and admit that some of it is very difficult, but they persevere and demonstrate resilience with mathematics. These students comprise three males and one female with MAS-UK scores ranging from 28 to 67.

Two final themes use metaphors to symbolise their feelings towards mathematics. These are 'Mount Everest' and 'Something that is parked there.' These themes highlight a struggle or challenge with mathematics, as well as the feeling of reluctance to engage with mathematics and that it is not what the student really wants to do, even though it is a requirement. These students are both females and have MAS-UK scores of 61 and 86 respectively.

Discussion

Students demonstrating higher levels of mathematics anxiety tend to have negative attitudes towards mathematics and negativity in respect of their ability in the subject (Ashcraft, 2002). The themes presented in this study reflect a variety of attitudes towards mathematics based on the students' engagement with the subject throughout their lives. These mature students have shared insights into their mathematics stories and characterised these insights using sometimes evocative language. The themes presented in the title – divorce, evil and the regime of terror – reflect harsh backdrops to the students' engagement with mathematics, as their respective explanations have conveyed. In each case the mathematics support facilities at the higher education institutions have been instrumental in the students' success in mathematics in higher education. Exposure to different uses of mathematics in the workplace has also contributed to them seeing the relevance of mathematics.

Among the other themes presented, the positive themes demonstrated an awareness of the importance of mathematics as a subject and its significance to the students' programmes of study, and these were matched with relatively low levels of mathematics anxiety. In contrast the negative themes illustrated the complexity of mathematics for some students, and a sense of struggling with the subject, enhanced by the use of negative connotations such as dislike, unfriendliness, fear and avoidance. For some students there is an admittance that they do not want to do mathematics but have to in order to fulfil their programme requirements. These negative feelings reflect the relatively higher levels of mathematics anxiety. The remaining themes demonstrated contrasting feelings towards mathematics, illustrating a sense of awareness of the importance of mathematics, while being apprehensive about the subject and persevering with it. The use of metaphors also encapsulated the sense of difficulty that some students attach to mathematics.

Mature students overcome many challenges in order to engage effectively with their undergraduate programmes of study. Service mathematics is – for many mature students – one of these challenges (Fitzmaurice et al., 2014). The mature students that participated in this study have presented various levels of mathematics anxiety as facilitated through the MAS-UK test, and through their interview contributions have talked about diverse challenges posed by mathematics in different ways; some of these mature students embrace these challenges, actively seeking help, while having an appreciation of the benefit and relevance of the subject to their future careers. For others, engagement with mathematics may represent the biggest academic challenge they have to face, and they do so with mixed feelings, comprising feelings about past experiences, as well as a motivation not to let their difficulties with mathematics have a detrimental effect on them.

Conclusion

Having interviewed these twenty mature students, the researcher has been exposed to stories of how these individuals have experienced mathematics from their earliest days at school to the present day. Their mathematics life stories have emphasised the importance of those early experiences in shaping their life's engagement with mathematics, including interactions with significant people, such as teachers and parents, in respect of mathematics (Ryan & Fitzmaurice, 2017). In addition, the mathematics life stories of these mature students have heightened the awareness of the author to those issues conducive or detrimental to effective learning of mathematics. Negative experiences – sometimes stemming from a repeated lack of understanding of concepts – can impact severely on a student's confidence and self-esteem around mathematics, sometimes scarring them in respect of subsequent engagement with the subject.

Fortunately, as these students have revealed, with adequate support and coping strategies adversity towards mathematics can be tackled and overcome leading to success in mathematics (Safford-Ramus, 2008; Fitzmaurice et al., 2014); to this end the varied mathematics support services provided by higher education institutions play an important role (Lawson et al., 2003; Fitzmaurice et al., 2014) especially to those students struggling with mathematics as a consequence of mathematics anxiety. In addition, allowing students the space to talk about their – particularly negative – mathematics experiences (Tobias, 1993), can contribute to the healing process of those scars left behind from negative experiences. In this regard the mathematics life story interview serves a valuable purpose in helping mature students with any level of mathematics anxiety elicit their experiences and identify the challenges that mathematics poses to them as mature students.

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