

A Portrait of Disaffection with School Mathematics: The Case of Anna

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Disaffection with school mathematics is a serious and important issue with social, economic and individual consequences. However, it is under-researched, and a case is made that this situation should be addressed. Although attention has shifted to the study of affect in mathematics education, much of the research on affect concerns attitude and is undertaken from statistical point of view. It is argued that disaffection should be viewed as a motivational and emotional phenomenon, and that a phenomenological approach, combined with qualitative methods, will help to understand the phenomenon more deeply from the point of view of students who experience such disaffection. This paper presents a case study of Anna, as an example of how the individuality and idiosyncrasy of the phenomenon belies the simple characterisation associated with 'negative attitude'.

Keywords: mathematics, disaffection, motivation, emotion

Disaffection with school mathematics is a serious and widespread problem with serious social and economic consequences that also affects the life chances of countless young people. In the UK alone, substantial attention has been focussed by governmental and non-governmental bodies on the general issue of disaffection with education (Birdwell, Grist, & Margo, 2011). Lumby (2012) in a wide-ranging review, states: "from a global perspective, the position of youth is calamitous" (p.262). Lumby notes that the issue goes beyond issues of economics or employability, but is, in effect, related to human rights. He also locates the issue as a psychological and motivational one, and one where students' voice needs to be taken seriously, or as he suggests "authentic listening with sustained attentiveness" (p.267).

In the UK deep concern has been expressed about mathematics over a long time (CBI, 2010; Vorderman et al. 2011) but the concern is international. Trends in International Mathematics and Science Studies (TIMSS) has provided comprehensive international comparative data on attainment, but also on attitude to school mathematics. It documents consistent declines in attitudes and confidence from Grade 4 to Grade 8 in the US. For instance, in the 2003 results, 20% of US students disagree that they enjoy mathematics at Grade 4, whilst by Grade 8 this has increased to 31%. The figures for the US and England (to take two examples) also show significant declines in affective variable scores since 1995 (Mullis, Martin, Gonzales, & Chrostowski, 2003).

Smith et al. (2005) in their review of motivation in schools speak of current concern about significant numbers of pupils who are becoming disaffected and disengaged. This concern is not confined to the UK. Middleton and Spanias (1999) among many others, point to evidence of a decline in attitude to mathematics on transfer to secondary school in the US. This has led the National Council of Teachers of Mathematics (NCTM) to focus explicitly on the motivational domain. That motivation is seen as a potential lever in improving standards is also reflected in the UK (see, for instance, Kyriacou & Goulding (2007)). The argument, either explicit or implicit, is that if we can understand affect and its interaction with learning and cognition, it might be possible to improve engagement and thence attainment. The study reported here is aimed at understanding more deeply the phenomenon of disaffection.

Disaffection is not an easy construct to characterise in research terms. This is perhaps not surprising since, by definition, it means 'negative affect', and affect itself has proved to be complex, contentious, and impervious to attempts at simple characterisation (Hannula, Pantziara, Waage, & Schloglmann, 2010). Characterisations of disaffection in educational research have focused on truanting and bad behaviour. Nardi and Steward (2003) have sought to widen the definition to include 'quiet disaffection', meaning low engagement and perceived lack of relevance. The term has also been used operationally to mean negative attitude or emotion. In the current study, the construct is recognised as a multi-dimensional and complex one, and one that manifests across a range of other affective constructs such as attitude, belief, motivation and emotion.

Despite the importance and impact of the problem of disaffection with mathematics, and rather surprisingly, it is not

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well researched. Indeed, in the UK, in their State of the Nation Report on mathematics (The Royal Society, 2008) cites only three studies. Whilst this is disappointingly low, studies that do focus on disaffection with mathematics tend to do so from the point of view of achievement, progression or participation, and the issue of the experience of disaffection from the point of view of the student is often unexplored. In recent years, however, there has been a growth in interest and research in affect in mathematics education, and the phenomenon of disaffection is clearly located in the notion of affect. McLeod's (1992) description of the field of affect as comprising attitudes, beliefs and emotions has been extremely influential in the field. This, along with the fact that it is methodologically easier to study such phenomena from a statistical and positivistic perspective, has resulted in research in the field being dominated by quantitative studies of attitude. Moreover, these studies have often struggled to escape the behaviorist legacy, and are also heavily influenced by the notion of trait, since attitudes and other affective variables are often assumed to be homeostatic. The field is littered with one-off correlational studies that seek the holy grail of relating attitude variables to outcome measures such as performance in examinations, and as Ma and Kishor (1997) and others have pointed out, this seems unlikely to uncover deeper understanding of learning (or failing to learn) mathematics. Further, as Ruffell, Mason, and Allen (1998) have pointed out, the construct of attitude is problematic and arguably perhaps not fit for purpose.

More recent developments have seen attention move to a focus on motivational and emotional constructs in order to gain further insights (Op't Eynde & Turner, 2006; Hannula, 2006). But, as Hannula has pointed out, "motivation has received the most attention among educational psychologists, but remained peripheral within mathematics education" (p.117). Motivational research in mathematics education has been dominated by consideration of the cognitive perspective, focusing as it does on goals, beliefs and attributions. Pintrich (2003) has pointed out "the role of affective factors, including both general moods and specific emotions, are not well understood and have often been ignored in our current social-cognitive models of motivation" (p.679). With the exception of anxiety, there has been little study of the role of emotions. Although McLeod's formulation of affect did include emotions (the approach borrowed from Mandler) there is little theorisation of emotion in mathematics education literature, and little consideration of emotion beyond anxiety or simple positive-negative classifications. Another weakness of research in this area – influenced by cognitive-dominated models – is that emotion is seen as an outcome or by-product of interaction with school mathematics. With the development of more systems approaches (Op't Eynde & Turner, 2006), it will be necessary to see emotion as an affective system in its own right, of equal importance to cognition,

motivation and self-regulatory systems in our understanding of how people engage with and learn mathematics.

In summary, it seems clear from this analysis that a focus on the motivational and emotional aspects of students' experience, which requires a more phenomenological and qualitative approach, will provide a deeper understanding of disaffection from the point of view of the subject. Further, and in contrast to large scale surveys of attitude, it was decided to adopt a more idiographic approach to the present study (Gee, 2011). In contrast to the more nomothetic approach of attitude surveys, it was judged important to get a deeper insight into the life world of disaffected students, and thus a case study approach was adopted.

Theory and Methods

Reversal Theory (Apter, 2001) was adopted as a powerful interpretative and explanatory framework which could inform the design and analysis of data relating to disaffection with school mathematics. The theory has significant advantages and potential in the area of educational research. It is a theory with wide scope and generality; this sets it apart from the loose or questionable theoretical underpinnings of many of the quantitative and correlative studies mentioned. As a theory of motivation it has a wider reach than, for instance, Self Determination Theory (SDT); (Deci, Koestner, & Ryan, 2001), in that it addresses a range of motivational factors that are unconsidered in SDT. Altruism and negativism are just two that come immediately to mind. Finally, it gives an account of a full range of emotions and how they relate to motivational states. There are very few theory-driven accounts of emotions in educational research.

Reversal Theory informed the design of the research intervention. The primary method used for qualitative data collection was the one-to-one interview. In order to facilitate disclosure and discussion around the difficult subject of negative affect, two instruments were adapted or designed to assist the elicitation of deeper aspects of the subjective experience of learning mathematics.

The Tension and Effort Stress Inventory (TESI, Svebak, 1993), was designed to be a one-page survey measure with an integrative orientation to the experience of stress. It is based on the Reversal Theory account of unpleasant emotions or moods. "The TESI has proved to be a practical instrument for quantitative assessments of the subjective experience of exposure to stressors" (Svebak, 1993, p.189). It is reasoned that disaffection will be associated with the experience of such unpleasant emotions. The test was adjusted to make the wording appropriate and relevant to the mathematics education context (TESI-ME). In addition, the labels for the emotions were altered where necessary to reflect current language use within this social grouping. The purpose of the questionnaire in this study was to gauge the prevalence

of negative moods and emotions in a group of students who were likely to be disaffected.

The second instrument, 'Me and mathematics', was a grid with a horizontal axis marked out with school years 1 through 12, and a vertical axis marked from -5 to +5. Students were invited to place a point on the scale for each school year. In this way, they plotted a graphical representation of their mathematics life history. Students were also offered two sets of colored cards in turn and asked to choose those cards which represented something meaningful about their own experience of mathematics. The first set of cards represented positive emotions, as indicated by Reversal Theory. In the second set, each card was labelled with a motivationally significant or valent word or phrase, again all positive. Again, these were suggested by the eight motivational states as defined in Reversal Theory. The card sort was an attempt to understand the presence of more positive affect in the experience of these students.

The Current Study

The data reported here concerns students in two Further Education Colleges (16-18 years old), who, having performed poorly ("failed") in national mathematics examinations at aged 15, were required by the College to undertake a basic level *Use of Mathematics* program. There were four classes of students on these courses in each college. Given this background it was expected that significant numbers of these students would be disaffected. Four classes of students (n=120) were surveyed using the TESI-ME.

The methods outlined above were all either available for discussion during the interview, or generated within it. The interviews then explored the rationale for their choices and involved probing for further meaning and specific examples. Further questions were asked to elicit aspects of their positive and negative experiences of classroom mathematics.

The interviews were transcribed and the data were coded to highlight motivationally and emotionally significant passages, events and interpretations. Reversal Theory constructs were used as a framework for analysing the responses. However, what was of interest were the choices made, and the descriptions and meanings surrounding these choices.

Case Study – Anna: A Portrait of Disaffection

Anna is a complex and interesting character. That she is disaffected with mathematics is shown by her life history. It starts positive but low, and even receives a boost in year 8/9, but thereafter drops dramatically into the negative. Having got on with mathematics unremarkably in her early school career, and made progress, events had a dramatic effect, and despite her competence, she "failed" (in her own terms) her national examinations at age 15. This failure appears central to her subsequent experience of mathematics.

She presented at interview as bright, very thoughtful and full of curiosity. She was very small, and very gentle, but lively, and her manner belied her strong views. She was articulate about her disaffection and this made her a particularly good subject.

Early Years – a Time of Innocence

By her own account, Anna got on with mathematics in the early years in a quite unproblematic way. She didn't regard mathematics as in any way special, or different or even difficult. Indeed, she seems almost surprised herself that she hardly recognised it as a separate subject.

It was just something... I just thought we had to do... like at school... when you're at primary school you have to do geography and everything... you don't actually think about it... it's just work... you just do it.

She gets on with it, and she finds it "not too hard." We see here a quite conforming attitude and approach (although this was to change). And at this stage, her given epistemology of mathematics is quite limited (and this was to change also). However, she was able to do it, even though she didn't see it as her favorite subject. She doesn't particularly enjoy it. In retrospect, although she doesn't offer this as a cause-effect explanation, this is a time of innocence where, in her words:

At primary we just get stuff to do... not too hard really... we don't get like sets or grades... like in college you get grades like 4b or 4c or whatever... like A's and B's and stuff like that. We didn't get grades then... so it was just like doing work.

Not getting grades makes it just like doing work: This is an interesting juxtaposition. "Just" doing work sounds so unthreatening. But it also suggests a fairly malign view of the effect of getting grades. This is significant because it is precisely these "grades" that come to dominate her experience later on, and represent a major cause of her disaffection.

She obviously does well, reporting that she did well in her earlier national tests and was promoted to the second set. And although mathematics didn't excite her interest too much, she does report that "shapes" were her favorite thing.

Decline into Disaffection – Innocence Lost: Why Aren't I an A or B Anymore?

A key watershed in her experience of mathematics is that, having been told that she was an "A or B student" in year 9, she then suddenly found herself demoted to the status of "C/D". This is a seminal experience, and one from which she still has not fully recovered. As she says "after that, it just went down and down." Mathematics had never been one

of her priorities, but she had still thrived and succeeded. It all changed quite suddenly and unexpectedly. She describes that she had trouble at home, and then she did poorly in an exam. In a very short course of time the world came to view her in a different light, and this leads her to view herself in a different light also.

One of the interesting features of this account is that she shows a strong sense of the relationship between her behavior and the outcome. She didn't practice; she didn't do as much homework – she is taking responsibility for the outcome. This is an important part of her style, and we will comment on it again later. Here she gives part of the explanation of the decline:

I just lost interest... in it... I dunno... I was never like interested in it... (pause)... I dunno... one of them things... practice... you have to actually like it.

The sense of loss at being re-classified seems to be a mystery to Anna, and one that clearly hurts her deeply.

Cos if in year 9... I'm told I'm going to get a B... and in year 10 I'm now told I get a C/D... that's not good is it?

Anna does try to recover both the grade, and her position and status in mathematics, but she has a hard journey ahead. She failed the national exam. She now says she is just “doing it for the grade,” but there are hints that there is more to it than that.

The Experience of Disaffection – Once I was a B and now I'm a really bad D

We have already noted that Anna has a range of negative feelings about mathematics due to her experiences at school. But these carry over and color her experience of college. On the TESI-ME she scores 6 for stress. She explains:

Yes... sometimes I just don't get it... and don't get why we have to do it.

More specifically, she reports medium-to-high anxiety (score 5):

Apparently I've got anxiety my doctor says... I'm not too sure what it is... but panic... ignoring that... I do sometimes panic... when you get... exams... kind of freak out like shit... I don't think I'm gonna pass this.

When asked about exams and stress, she articulates the fear very clearly. Again, she feels intimidated by the labelling that grades represent, and this very public comparison to others is also damaging. But part of the meaning of

that for her is that it also tells her she hasn't done the best she can. Again, she takes ownership of the outcome – it's nobody else's fault but her own. It appears she feels guilty for letting herself down, and as a result, she feels “kinda dumb,” or more poignantly, “I feel like a really bad D.” And again, she returns to the comparison that she was told she was a B, and she once felt like a B, and now she is a D, and she can't understand why. No wonder she feels anger and resentment at this situation. She also feels guilty that she let her domestic situation affect her so much. Even this guilt is compounded by her adverse comparisons to others – in this case her boyfriend, who also had (“even worse”) problems than her, but still did well in mathematics. In terms of her poor performance then, her first instinct is not to blame others. She shows humility in her questioning of herself:

Not being able to get that B... that's what makes me angry... and I don't get why I can't get it... is it the teachers?... is it me?... I dunno... I understand the work... I just can't seem...

Anna's version of anger contrasts somewhat with descriptions in this data from other students. On the whole, other students describe anger as an in-the-moment phenomenon that is triggered as part of a negative sequence of events and their associated motivations and emotions. Since it is uncomfortable, actions are usually taken to mitigate against the anger. The anger that Anna describes is more prevailing – it is enduring over time. The emotion is stabilising into a negative orientation to the world – a crystallised way of interpreting certain phenomena. We can conclude that she does not find mathematics at college very easy – now she has to work at it.

Anna from a Reversal Theory Point of View

To understand a little more about Anna's experience of disaffection it is useful to examine her motivations and emotions from a Reversal Theory point of view. Part of the depth of her disaffection arises not just because of the intensity of the feelings, but also because there is a gap between her motivational needs and the reality of her motivational states. This means that, almost whatever state she is in, she is dissatisfied – she is trapped into negative evaluations of her situation.

When examined from a Reversal Theory point of view, perhaps one of the most interesting aspects of Anna's motivational landscape in relation to her disaffection is her transformation from conformity to rebelliousness. She was fairly conforming in relation to school mathematics in her early years. The overall impression from her description of primary school and early secondary is that she did what she was “supposed” to do. As she put it: “You just get work to do and you do it.” There is no hint here that she questioned her role or obligations. This changes significantly. In

her account of her experience from year 9/10 we see a very strong expression of rebelliousness in Anna. This rebelliousness is clear in her descriptions of her anger and resentment at her situation. This anger arises in the serious-rebellious state combination, when arousal is high. But it is also clear in her general questioning demeanour. This rebelliousness manifests in a number of ways. It manifests in conjunction with the serious state in her perception that she was a B, and is now a D. You can almost hear her sense of unfairness in her explanations of this. That is *not* supposed to happen. Some rule or expectation, for her, has been broken, and this excites the rebellious state. We can hear her rebelliousness in her off-the-cuff critique of how the notion of research is presented in her fashion classes, as well as her evaluation of other aspects of her experience of mathematics teaching. Her fight to get put into the booster classes is a clear expression of disapproval and rebelliousness. It is also interesting to see how often she displays her more mischievous side, which can be interpreted as the playful and rebellious state combination (paratelic negativism). This is demonstrated best in her turning the tables to interview me, but pervades her attitudes and approach, and is likely to be a more socially acceptable way to express her negativism than anger.

It is also instructive to look at the notion of purpose or achievement – which is the driving value of the serious motivational state. For Anna we can see that this operates in both the foreground and in the (longer term) background. In the context of College mathematics, the serious motivational state relates to the successful completion of tasks. The evidence here shows that she takes this seriously (in the everyday sense of the word). She wants to succeed, and she applies effort (but not particularly interest). We can describe her approach as serious-mastery, since she not only wants to complete the tasks, but she has a competitive mastery orientation that means she needs to do better than those around her. So she works alone to help her to achieve this. And indeed, she is able to derive some sense of satisfaction in this mode. She reports relaxation (the pleasant emotion associated with satisfaction in the serious-conforming state combination) when she has done something well. She reports a sense of pride (the pleasant emotion associated with “winning” in the self-mastery state combination) when she gets good scores on tests, and she describes (below) her pleasure at being able to help others who don’t “get it.”

But this in-the-moment foreground activity is balanced by the longer term background need for achievement. And this is based on a competitive interpretation of success. For some students, satisfaction in the serious state can be gained by an appreciation of the importance or utility of school mathematics. But in this sense, Anna is ambivalent, although her sense of this importance, and indeed, her notion of what mathematics is, develops in sophistication during her college years. It has already been noted that, in her primary years, she classi-

fied mathematics as “just work,” and she was hardly able to differentiate it from other subjects.

I couldn’t actually tell I was doing maths in primary school... you understand?

This unconsidered epistemology of mathematics may in part explain why she “sleepwalked” into a situation that she later could not control. We have already noted that she shows little sense of enjoyment of mathematics (apart from “liking shapes”) in her early years. The way she talks about mathematics currently suggests that, along with her developing maturity through her life experiences, and experience of other subjects, there is an emerging sense that there is somehow more to mathematics than she has previously given credit for. Statements like “Maths... it’s got so many things to it”, and “it’s like art”, give a hint of this. It is stated more explicitly in:

Maths is like a pivotal subject isn’t it? It’s like physics and stuff are based around maths aren’t they?

Much of this developing sense of the importance and scope of mathematics comes from her reflections on her own experience:

Cos I wanna be a fashion designer... I make the paper block... which is basically like the net of a cube... but the dress version... does that make sense?... and I have to add seam allowance... which is the flappy bits you add to allow for glue... stuff like that... so until I actually did that... I didn’t think I’d need maths... does that make sense?

In these ways we can see that her experience of the serious state in relation to school mathematics develops over time. It starts in primary as being “just work”, but unproblematically so since she could do the work. During and after the difficult years, the serious-conforming state has become broken for her, tainted as it is by the sense of failure. Her experience is also massively colored by the humiliation of the damaging effect of her feeling labelled. She talks eloquently of her sense of purposelessness – of not being able to envisage a successful outcome in this frame, or even of having, at times, a sense of “why bother” with this. She clearly has an overriding need to achieve a pass at GCSE, but this is a frustration, since it has so far escaped her. She carries this need going forward, but suffers anxiety at exams (an emotional consequence of the serious-conforming state combination together with high arousal), and feels she is likely to fail. However, during her college years, she begins to gain an appreciation (and potential satisfaction) from a more positive interpretation of the use of mathematics.

On the other hand, she displays a good deal of evidence of being regularly in the playful state – but not in relation to her activities in the mathematics class, where she seems unable to find expression for it. She rarely expresses any paratelic enjoyment of work in mathematics, except perhaps when describing her pleasure at discovering that nets are useful in fashion design (an interest in “shapes” that she carries from her primary school experience). Her curiosity, her interest in my past and motives, are all evidence of her playfulness.

In terms of the transactional emotions, her experience is driven by the motivational state of mastery. In her case, unfortunately, this is often mastery-losing. When she is in the self-mastery (losing) state combination, this is experienced as humiliation, and we see plenty of evidence of this. When it is experienced as self-sympathy (losing) it is experienced as resentment (i.e. I am not getting what is due to me – success). Her sense of mastery is sharpened by the fact that she uses external measures to evaluate her mastery position. Where she stands in relation to other people is very important to her. She is in fact, very competitive. She describes classroom strategies that increase her chances of outperforming the other classmates.

So... I feel quite competitive... like I want to do better than everyone in this class... but I don't know if I will (laughs)

Even within the context of her positive experiences of helping others (other oriented mastery), she recounts:

It makes you feel good... because you get it and someone else doesn't... so you feel a bit proud... but if you're helping them... you feel a bit nice about it... does that make sense?

Notice the conflicted response here. Beating someone else makes her feel proud. Does that in turn make her feel “not nice?” Her “does that make sense” comment hints at her ambivalence about feeling good because someone else doesn't understand. This ambivalence carries over into the notion of helping other people – which clearly gives her satisfaction. But she is at the same time aware of her pleasure at seeing others do not as well as her. Here is her description, illustrating this ambivalence – the reality of the pull of different and contradictory motivational states:

It's not like I can do it and they can't... it's like I *can* do it... and they can't... it's not like they're bad... not like ohmigod I got better than her... I don't really care what they got... I got better than them... it's not about them... it's just a good feeling isn't it?

And this, for her, helps her to explain why helping others is not only a good thing to do, but also useful to her:

Because apparently if you teach someone you understand it more yourself... cos you're repeating it... cos maths is about practice... you're technically just repeating it... it does help... if you help other people you learn yourself.

From the evidence here, the progression appears to be:

- Competitiveness, and an attempt to do better than the others (self-mastery), leading to a sense of pride (if successful).
- She then notices the lack of progress in others (other-sympathy), which may trigger a sense of guilt.
- This causes her to help her classmates (other-mastery).
- Which in turn results in her feeling “nice” (self-sympathy).

In this way, helping others can be seen to be a motivationally rich activity for Anna, since it satisfies a range of motivational needs – even though some of them are contradictory.

A Chance to Right the Wrong

Given the analysis above, it is now possible to evaluate Anna's motivational relationship to mathematics in her current situation. Although Anna insists that she still doesn't like mathematics, it seems that passing is the only way she can recover the sense of achievement and competitive mastery that she lost in year 9 and 10. As she puts it – “I'm going for the grade.” She is at pains to emphasise that she does not need the mathematics as she could get a job without it.

But making progress, being able to do the tasks, does provide her with sense of achievement and positive emotion and satisfaction. Being able to “do it” and getting good marks makes her feel proud – particularly when others can't do it. We can infer that it restores her sense of competitive self-mastery.

When I get something right... I do feel quite relaxed... like when you go shopping or something and you can actually work it out before you go to the till... you're quite grateful you learnt it... does that make sense?

And she is willing to put effort and determination into the search. We can see this in her efforts in “begging” the teachers to let her do the booster classes. Her description of her sitting alone, so as not to be distracted by others also shows her competitive determination to do well this time around.

She also has a sense of realism. When asked what she would do if she needed A level mathematics (a specialist, post-compulsory qualification) to get a great job in fashion, she replies:

Eh... but I would do it... I would probably put everything I had into maths... you

can... it's just time and effort... I'm not too sure... it's just a theory but... it's like business isn't it... business is time and effort and that's how you get a lot of money.

In fact, she uses this notion of practice to explain to herself how she fell behind in the first place:

I kinda lost a lot of practice as well... cos things weren't great... so... obviously I wasn't doing as much homework as I should.

This notion of practice, together with her strong sense of personal responsibility leads her to change her mind about how success is achieved:

I used to think that people are just born smart... but then I kinda got my head round it and now I just think... (hesitates)... it's time and effort... you're not just born smart... it's time and effort... it's how much you put into it... cos anyone can get good grades... you can... like if you went home and if you went through everything everyday... and you were that organised... you can get good grades... I think it's time and effort.

Anna's story contains a dominant narrative, and this is one of her anger and anguish at being classified as a "C/D" and her corresponding performance at that "failed" level. This experience is in stark contrast to her early, innocent years, before labelling and failure, when she was able to get on with school mathematics in a seemingly untroubled way. However, the consequences of her failure go deep, and provide the motivational and emotional context in which all of her subsequent experiences are filtered and interpreted.

Conclusion

Although it is important to be measured when generalising from a single case study, this case (along with others in the larger study) demonstrates a number of points. It shows from a first-person point of view just how damaging and disabling disaffection with mathematics can be, and the full motivational and emotional impact that lack of achievement and competence can have on an individual. The case study gives a rich account of the experience of disaffection – the factors that bring it about, together with the volatility of young peoples' experience with mathematics (which is elsewhere assumed to be relatively fixed).

The study also demonstrates the efficacy of the Reversal Theory framework and constructs as a means, not only to design the methods for the study, but also as an interpretative framework. It gives us a means to examine the full range of emotions experienced by Anna, and to be able to understand the sequences of motivations and emotions, and how

they come about in her experience of mathematics. In general terms, it also shows the value of intense, qualitative and idiographic studies in illustrating important aspects of young peoples' subjective experience.

Finally, the study provides more qualitative evidence of reversals themselves. In these ways, a case has been established for the further study of educational phenomena using the Reversal Theory framework.

References

- Apter, M. J. (Ed.). (2001). *Motivational styles in everyday life: A guide to reversal theory*. Washington, DC: American Psychological Association.
- Birdwell, J., Grist, M., & Margo, J. (2011). *The forgotten half*. Demos: London. Retrieved from: http://www.demos.co.uk/files/The_Forgotten_Half_-_web.pdf
- CBI. (2010). *Making it all add up: Business priorities for numeracy and maths*. CBI: London. Retrieved from: <http://www.cbi.org.uk/media/935352/2010.08-making-it-all-add-up.pdf>
- Deci, E., L., Koestner, R., & Ryan, R., M. (2001). Extrinsic rewards and intrinsic motivation in education: Reconsidered once again. *Review of Educational Research*, 71(1), 1-27.
- Gee, P. (2011). Approach and sensibility: A personal reflection on analysis and writing using interpretative phenomenological analysis. *Qualitative Methods In Psychology Bulletin*, (11), 8-22.
- Hannula, M., Pantziara, M., Waage, K., & Schloglmann, W. (2010). Introduction: Multimethod approaches to the multidimensional affect in mathematics education. *Proceedings of Cerme 6, Lyon France*
- Hannula, M., S. (2006). Motivation in mathematics: Goals reflected in emotions. *Educational Studies in Mathematics*, 63(2), 165-178.
- Kyriacou, C., & Gouling, M. (2007). Researching classroom activities to raise secondary school pupils motivational effort in mathematics. *Psychology of Education Review*, 31(1), 34-40.
- Lumby, J. (2012). Disengaged and disaffected young people: Surviving the system. *British Educational Research Journal*. 38(2), 261-279.
- Ma, X., & Kishor, N. (1997). Assessing the relationship between attitude towards mathematics and achievement in mathematics, a meta-analysis. *Journal for Research in Mathematics Education*, 28(1), 26-47.
- McLeod, D. (1992). Research on affect in mathematics education: A reconceptualization. In De Grouws A. (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 575-598). New York: NCTM.
- Middleton, J., A., & Spanias, P., A. (1999). Motivation for achievement in mathematics: Findings, generalizations,

- and criticisms of the research. *Journal for Research in Mathematics Education*, 30(1), 65-88.
- Mullis, I. V. S., Martin, M. O., Gonzales, E. J., & Chrostowski, S. J. (2003). *TIMSS 2003 international mathematical report*. Boston, MA: TIMSS & PIRLS International Study Center.
- Nardi, E., & Steward, S. (2003). Is mathematics T.I.R.E.D.? A profile of quiet disaffection in the secondary mathematics classroom. *British Educational Research Journal*, 29(3), 345-367.
- Op't Eynde, P., & Turner, J. (2006). Focusing on the complexity of emotional issues in academic learning: A dynamical component systems approach. *Educational Psychology Review*, 18, 361-376.
- Pintrich, P. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, 95(4), 667-686.
- Ruffell, M., Mason, J., & Allen, B. (1998). Studying attitude to mathematics. *Educational Studies in Mathematics* 35, 1-18., 35(1)
- Smith, C., Dakers, J., Dow, W., Head, G., Sutherland, M., & Irwin, R. (2005). *A systematic review of what pupils, aged 11-16, believe impacts on their motivation to learn in the classroom*. London EPPI-centre, Social Science Research Unit, Institute of Education, London.
- Svebak, S. (1993). The development of the tension and effort stress inventory (TESI). In J. H. Kerr, S. J. Murgatroyd, M. J. Apter, J. H. Kerr, S. J. Murgatroyd & M. J. Apter (Eds.), *Advances in reversal theory*. (pp. 189-204). Lisse Netherlands: Swets & Zeitlinger Publishers.
- The Royal Society. (2008). *State of the nation: Science and mathematics education, 14-19*. London: The Royal Society.
- Vorderman, C., Budd, C., Dunne, R., Hart, M., & Porkess, R. (2011). *A world-class mathematics education for all our young people*. Government task force.