Managing anxiety in the classroom: how small group work helps students manage the effects of their anxiety.

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Abstract

This small-scale study reports on an intervention that was implemented following on from previous investigation in my school. Variations in some students' self-efficacy and self-regulation were identified, and some students reported fear of failure, which was cited as a reason for low participation or avoidance of learning. The intervention reported in this paper was purposeful, supporting students who required additional support and often struggled to regulate learning behaviours in lessons.

Analysis of the data indicates students were generally better able to express themselves after the intervention, providing more detailed responses to questions in their post-intervention questionnaires. Student reports of anxiety appear to increase after the intervention, which may be attributable to increased awareness, greater trust in the teacher and the setting, or a real increase in anxiety at that point in time. Initial analysis shows that post-intervention, students increase their use of others, be that teacher or peers, when they experience anxiety. Data also indicate that some students may have greater self-efficacy when approaching hard problems post-intervention, with an increase in the number of students who cite effort and thinking as important when tacking challenges.

Educational and psychological research is discussed in the context of these findings, as well as implications for future practice.

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Managing anxiety in the classroom: how small group work helps students manage the effects of their anxiety

If we don't give space to failure and mistakes, there is no space for real learning
- Ayumi, OECD 2020

The level of anxiety students feel is related to how supportive they feel their teachers and schools are
- OECD Education, Twitter, 2017

1.0 Introduction

Schools have an increasingly complex role in the lives of students, teaching young people new knowledge while building emotional and social skills to support future fulfilling personal and working lives (Spratt, 2016). International organisations have identified problem solving, adaptability, and critical thinking (among others) as vital contributors to future healthy lives (UNESCO, 2014; OECD, 2015; EC, 2017), while in-depth European research highlights how success in these academic areas is hampered by anxiety and low self-related beliefs (Radišic et al., 2018). The opportunity for schools to positively affect anxiety, and other wellbeing indicators that impact students' school experience, is considered low according to analysis of Programme for International Students Assessment (PISA) 2015 data (Govorova et al., 2020), and varies according to setting.

The dichotomy of schools seeking to support student wellbeing and lower anxiety, while seeming to have little impact compared to other factors in the life of a student (Govorova et al., 2020), suggests exploration at a local level is important for developing practices in schools. As individuals, each student brings with them a unique set of changeable circumstances requiring adaptable approaches to teaching and pastoral care. What works for one child may not work for another and what has worked on one day may not work the next. Taking reference from Horre (1998), students' self-concept relates to their contextual self within the environment, how they see themselves at a given time, and how they believe others see them. External feedback, or perception of external feedback, is continually evolving as students interact with peers, teachers, and as positive classroom relationships

have been shown to help manage anxiety (Durlak et al., 2011). These complicated classroom dynamics need consideration when planning how to help anxious students.

1.1 School Context

Contrasting with government reports that the wellbeing of students in England from non-disadvantaged (DA) backgrounds and without additional needs is at a level comparable with pre-pandemic years (DfE, 2020), there is concern within my school that many students are struggling to return to school routines. These concerns have been expressed informally by teachers and support staff who have identified an increase in avoidant behaviours, from truancy to passive refusal to work as well as increased need for access to school counselling. These observations suggest that more students than previously are not coping with the requirements of school.

Although the above concerns are not specific to any one group of students, the school context does align with some DfE (2020) findings about wellbeing. My school has also seen students from DA backgrounds and those with additional needs experiencing greater emotional distress, decreased wellbeing, and increased anxiety. The covid pandemic may have a part to play in this increase but it is worth noting that staff have described a year-on-year trend of increasing disruption and decreasing engagement across the last three or four years, adding weight to an intervention that focuses on these trends.

The school, where the research for this paper was conducted, is a mixed, state, multicultural, urban comprehensive school, and is part of a larger Trust in the Southeast of England. Students are aged 11 to 16, with the first cohort of year 11 students graduating in 2020. The student body is made up of 52% English as an Additional Language (EAL), a figure significantly higher than the 2021 national average of 17%, while 28% of students are recorded as DA compared to the national average of 24% in mainstream schools. This means the school involved in this study has a slightly higher proportion of students who currently receive or have historically received free school meals, and/or have been fostered or in the care system.

Prior to deciding on a research focus, my role in the school was adapted to take on responsibility for intervention sessions for students with poor regulation or who were struggling to make progress. Results from my MSc 'part two' project, undertaken during covid lockdowns, highlighted how students worried about peer perception, judgement, and getting answers wrong. Although results were drawn from a small sample of students, coupled with teacher reports of increased anxiety and avoidant behaviours, I chose to focus my research and reading on addressing anxieties as well as teaching missed content.

Teachers in my school were already positively engaged with research around the reasons for student anxiety and maladaptive behaviours, following on from my sharing of MSc part two findings with the school, releasing a podcast reviewing research, and leading research-focused teacher development sessions across subjects. Informal discussions about research had become more commonplace, so colleagues were keen to engage with the research in this paper either through collaboration or discussion.

Before developing the intervention, it was important to explore the theory behind anxiety and anxiety-led behaviours in greater depth. The collaboration was then able to focus on applying aspects of the literature review to this specific context, bearing in mind the needs of individual students and the role of the teacher as the researcher. The following literature review will therefore explore anxiety as experienced by students and seek to identify ways in which the school and teachers can reduce negative impacts of high anxiety.

2.0 Literature Review

The mental health of children is a topic of increasing importance, not least in the wake of the recent covid-19 pandemic, as international meta-analyses of over 80,000 primary and secondary school children suggest a doubling of those with anxiety symptoms (Racine at al., 2021). The effect on student learning of increased anxiety and poor mental health is a concern among teachers in my school, while nationally the Department for Education (DfE) recognised the challenge and recently pledged £79m to support schools with student mental health (DfE, 2022) and help reduce the impact of poor mental health on learning.

My research aims to explore anxiety and its impacts across subjects, as although I teach mostly mathematics, the ambition is for all subjects in my school to benefit from the research and develop interventions across departments. Additionally, the focus will be primarily on anxiety in relation to students' internal processing and reactions in the classroom, as has been raised as a concern in my school, although the wider impact of anxiety on attainment, attendance, and future opportunities will also be touched on to provide context (Hembree, 1990; Carey et al., 2017).

2.1 Anxiety

Fear and worry are normal in children but, when these fears persist, they become anxiety (Shafer, 2010). Apprehension or worry about certain subjects or activities related to school is known as academic anxiety (Hasty et al., 2021), with most subject specific research focusing on anxiety in mathematics over other subjects (Barroso et al, 2021). Definitions of mathematics anxiety agree that the feelings of anxiety about mathematics extend beyond academic situations and affect ordinary life, impacting how children and adults manage, or avoid, situations requiring numerical competency (Richardson and Suinn, 1972; Ashcraft, 2002). Comparable to the definition of anxiety as a broad concept (Shafer, 2010), mathematics anxiety is the feeling of apprehension or fear of mathematics (Ashcraft, 2002).

While the link between mathematics anxiety and mathematics attainment is well-explored (Lee, 2009; Carey et al., 2016; Passolunghi et al., 2020), there is historically a lack of

attention on other subject anxieties and attainment as these are seen as less critical to everyday life (Barroso et al., 2021). This is not to say that anxiety related to non-mathematical subject does not exist. Studies have shown how foreign language use induces anxiety (Wu and Lin, 2014) and how musicians develop performance anxiety (Kenny, 2011), but the focus has remained heavily on the domain of mathematics and how anxiety affects future outcomes, often attainment related.

Test anxiety, an anxiety felt in or about an evaluative setting (Brown et al., 2011), correlates closely with mathematics anxiety, with both types of anxiety shown to have similar cognitive effects on working memory (Carey et al., 2017). Test anxiety refers to any assessment situation and the accompanying physiological, psychological, and behavioural responses that are intensified by a preoccupation with negative consequences or failures (Zeidner and Matthews, 2005). This is common across cultures and particularly prevalent in secondary school students, aged 11 – 18 (Lei et al., 2021), thought to be exacerbated by high stakes testing and test-based accountability in schools, as seen in the United Kingdom (UK) system (Embse and Hasson, 2012).

The close relationship between test and mathematics anxiety is not exclusive to these two forms of anxiety. The presence of heightened mathematics anxiety also increases the likelihood of other forms of anxiety also being observed, such as general anxiety (Wang et al., 2014). General anxiety refers to an individual's tendency to feel anxious about everyday situations (Carey et al., 2017). The broad nature of general anxiety, inclusive of social anxiety and physiological anxiety provides a background predisposition for anxiety, increasing the likelihood of more specific anxieties developing, such as mathematics anxiety or test anxiety (Dowker et al., 2016).

Extending the view that anxiety is the result of persistent worry or fear (Shafer, 2010), Eysenck (1997) views anxiety as having a prominent and pervasive effect, implying long-term effects on those with high levels of anxiety. While anxiety can be seen to positively increase extrinsic motivation to avoid failure and prompt effort (Ho et al., 2000), most researchers agree that all types of anxiety are generally negative due to the long-term and deep-rooted effects of this construct. To gain a clearer understanding of these effects it is helpful to first explore possible causes, looking at general anxiety and mathematics anxiety

side-by-side. Test anxiety, although mentioned will not be a key focus as the intervention within this research is not test based, and the concerns of my school are not focused on attainment at this point.

2.1.1 Causes of anxiety

General anxiety in a learning context stems from an individual's belief in the importance of high achievement coupled with low self-belief and lack of control over their learning experience (Pekrun, 2006). Dowker et al., (2016) argue that general anxiety, compared to mathematics anxiety or test anxiety, is less likely to be rooted in experiences of school or based on achievements, with wider-reaching impacts and drawing on students' experiences more broadly than just school.

In the case of mathematics anxiety, while this is closely linked to school experiences, it is not only school that influences levels of anxiety in students. Parents, as much as teachers, are considered to affect mathematics anxiety (Beilock et al., 2010), transmitting their own predispositions for anxiety onto children. Parents helping students with homework has been correlated with increased anxiety in children, but only when the parent has high mathematics anxiety themselves and expresses or displays nervousness in approaching mathematical problems (Maloney et al., 2015).

Similar findings, linking parental involvement with homework and with mathematics anxiety, were found using international analysis of large-scale studies (Lau et al., 2022). When completing homework with a parent, interpersonal factors such as parental support and parental attitude interact and affect anxiety levels. While the findings of Maloney at al. (2015) appear to be supported by global data (Lau et al., 2022), it is important to note that the 2015 study found parent mathematics anxiety to be a greater influence on student mathematics anxiety then general parental involvement, whereas the 2022 summary of international data found general parental involvement had a greater impact on anxiety levels. If parental involvement and homework are considered for any interventions to address students' mathematics anxiety, understanding more about how parent involvement affects student anxiety would be critical in creating supportive anxiety-reducing activities.

Placing an emphasis on the role of teachers, Macpherson (2016) argues that mathematics anxiety is primarily caused by poor teacher instruction and proposes effective techniques that encourage mastery and efficacy to reduce anxiety. Lau et al., (2022) develop this further, highlighting how both clear teacher instruction and students' confidence in their teacher help to reduce mathematics anxiety. Beilock et al., (2010), although agreeing with the role of the teacher in developing mathematics anxiety, considers stereotypes about mathematics ability to be the cause, passed to very young children and leading to girls learning anxiety from female teachers. This passing on of anxiety of stereotypical views is not exclusive to teachers, aligning with previously discussed work of Maloney et al. (2015) and Lau et al., (2022); parents can also pass on gender stereotyped ideas about mathematics and mathematics anxiety is more commonly seen among female students (Beilock et al., 2010).

An alternative, intrapersonal cause of anxiety is a sense of fear created by peer competition or rankings, pulling the focus away from learning (Lei et al., 2021). Extrinsic rewards from class ranking to merits, emphasise the result over the process, instilling (intentionally or unintentionally) fear in students that creates anxiety about school (Jackson, 2003). These rewards or sanctions also draw the focus to the consequences of failure, further heightening anxiety through fear of failure. Brophy (2005) agrees that grade and competition create anxiety, drawing from achievement theory (Atkinson, 1974) to explain how pride is at risk where students are continually comparing themselves to the group. Peer comparison then causes worry about 'looking dumb' and general anxiety about lessons (Mullen, 1983; Micari and Pazos, 2014; Cano et al., 2017).

It is difficult to say whether fear or worry initiate anxiety or these exist in parallel (Shafer, 2010; Dowker et al., 2016). An alternative to anxiety caused by fear, parental involvement or teaching is to consider anxiety as the root cause of negative emotions, feeding into maladaptive behaviours seen in classrooms. However, parental involvement, teacher influence, and social interaction affect anxiety; the manner in which these impact individuals varies greatly depending on factors external to school life such as genetic traits, and home environment (Muris, 2007), making it difficult to know the exact cause of anxiety for each student. Likewise, individuals' responses to anxiety may cause a combination of

interactions that lead to lack of enjoyment, fear, or unhelpful interactions that perpetuate anxious feelings (Dowker, et al., 2016). Therefore, responses to anxiety will be explored in the next section.

2.1.2 Effects of anxiety

Across all types of anxiety, the effects of high levels of anxiety on students are largely considered to be negative and range from the more observable behavioural reactions (Ahmed et al., 2012; Minahan and Rappaport, 2012) to internalised emotions or attitudes that are detrimental to students' physical and psychological development (Lei et al., 2021). Commonly, studies agree that high anxiety combined with negative cognitive or affective/emotional effects, results in lower attainment (Putwain et al., 2015; Lau et al., 2022), whether specifically in mathematical subjects or more broadly in cases of general anxiety.

Martin and Marsh (2003) disagree that low attainment is necessarily an outcome of high anxiety and suggest that how students manage their responses to anxiety affects academic outcomes. Where students 'overstrive' as a response to anxiety, and to meet a goal, these students can achieve positive results while learning that effort impacts outcomes and developing self-belief. On the other hand, overstriving is also thought to have concomitant factors such as low self-control and unstable self-esteem (Martin, 2001), bringing into question how helpful this behaviour is in supporting students long-term, and highlighting possible dangers of overstriving students failing and consequently engaging in failure-avoidant behaviours or learned helplessness (Dweck, 1985).

Dowker et al., (2016) argue, in respect of mathematics anxiety, that attitudes such as a lack of self-belief cannot be directly equated with anxiety as attitudes are cognitive whereas anxiety is emotional. This somewhat contradicts research that suggests there are both cognitive and affective components within mathematics, viewing anxiety as more complex than just an emotion (Hembree, 1990). However anxiety response is categorised, attitudes to mathematics influence responses to anxiety, with negative attitudes such as disinterest, dislike, or lack of confidence commonly prompting failure-avoidant behaviours and co-

occurring with anxiety (Thompson, 2004). This often-long-lasting relationship between negative attitudes to mathematics and mathematics anxiety is borne out through studies where students with high anxiety actively avoid courses and careers that involve aspects of mathematics (Scarpello, 2005).

Anxiety is closely correlated not just with fear of failure but also punctuality, poor 'study habits', and low self-esteem (Thompson, 2004), suggesting that anxiety feeds into or draws upon cognitive attitudes and behaviours or procrastination, avoidance, and low self-esteem often negatively associated with learning. Seeking to explain how anxiety interacts with avoidance in school, Martin and Marsh (2003) agree with Cano et al., (2017) that the employment of failure-avoidance is a response to fear of failure, which threatens self-worth. To protect themselves from possible failure, and reduce the impact on pride, students avoid learning or engage in self-handicapping by distracting from the learning or putting in less effort (Covington, 1982; Dweck, 1985).

Achievement theory supports this perspective that anxiety and fear (irrespective of which comes first) threaten self-worth (Atkinson, 1974), driving responses based on performance motivation (how well they perform compared to others) over mastery orientation (the drive for self-improvement). Students who adopt mastery are more likely to embrace an optimist approach (Martin and Marsh, 2003), understanding that increased effort improves the chances of success and accepting that failure is part of learning. This growth mindset approach can help students manage anxiety and self-regulate, leading to improved chances for success (Dweck, 1985).

Studies into the effects of anxiety commonly show a positive correlation with worry, with higher anxiety coexisting with higher levels of worry (Hembree, 1990; Lei et al., 2021). This is supported by large-scale summaries into effects of anxiety internationally, showing how worry develops in anxious students irrespective of age and culture (Lau et al., 2022). Studies, depending on their focus, have also highlighted affective aspects of anxiety, connecting high anxiety physiologically with tense muscles, sweating, and flushing (Minahan and Rappaport, 2012), as well as emotional responses of low self-esteem or nervousness (Thompson, 2004; Fischer et al., 2016).

Research tends to agree that the effects and responses to anxiety are cognitive or affective although interpretations of these terms is inconsistent. Henschel and Roike (2016) suggest that mathematics anxiety is an emotion, however in the same paper also refer to mathematics anxiety as multidimensional and consisting of emotional and cognitive factors. Hembree (1990), non-committal to deciding on direction of cause and effect, explains anxiety as an interplay of affective (emotional) and cognitive components, while acknowledging that cognitive worry and emotions are strongly associated. The following sections will discuss cognitive and affective aspects of anxiety separately, while recognising and exploring where these intersect. The literature reviewed will also explore the impact of these aspects of anxiety on the student.

2.2 Cognitive effects of anxiety

There is a consensus that anxiety of any kind reduces cognitive functioning by disrupting thought processes and taking up working memory (Dowker et al., 2016; Lau et al., 2022), reducing the ability to process information. Cognitive responses such as worry and intrusive thoughts concerned with failure can overwhelm students (Hembree, 1990; Ashcraft et al., 1992; Putwain et al., 2015). Findings by Ashcraft and Kirk (2001) support this, as they found that post-18 students who self-reported high mathematics anxiety had less effective working memories than students who reported lower mathematics anxiety. This meant these students required more time to complete calculations as the steps were more effortful.

The same effect was recorded with students as young as seven and those in secondary school. Students again took longer to complete mathematics tasks where they also reported high anxiety (Cargnelutti et al., 2017), as they experienced reduced working memory and employed less effective strategies than less anxious students. Similarly, more anxious secondary school students were found to have less effective fact retrieval, which requires working memory, but were also more likely to have poor inhibitory control compared to less anxious counterparts (Passolunghi, M. C. et al., 2016). Agreeing with Ashcraft and Kirk

(2001), Lau et al., (2022) consider poor working memory the result of anxiety, which disrupts students' cognitive resources and suggests anxiety is cognitive in effect.

Working memory is the subject of educational research into anxiety largely because this function is critical for students to learn, with working memory an active component for processing information (Baddeley, 1986). Processing efficiency theory (Eysenck and Calvo, 1992) explains the effect of anxiety on cognition as trait anxiety (a predisposition) and state anxiety (determined by the nature of the task). In high-stakes situations, state anxiety increases, inducing worry that interferes with processing efficiency due to the working memory being preoccupied with the perceived threat of low performance. The likelihood of this depends on trait anxiety, or how predisposed students are to be anxious.

Eysenck and Calvo (1992) posit students experiencing high anxiety and worry allocate additional resources to self-regulation by focusing on the task and employing strategies such as increased effort. This model suggests students will only avoid a situation where there are no aversive consequences attached to avoidance. However, this does not wholly account for avoidance tactics seen in students who report high worry and anxiety and for whom there are negative consequences for disengaging with a task or school in general, such as detentions (Sobba, 2019). Achievement theory goes some way to explain avoidance in these instances, as a balance of fear of failure and pride in success. Those who avoid work, knowing there is a punishment for doing so, attach self-worth more to avoiding failure than experiencing success, even considering negative consequences (Atkinson, 1974).

Processing efficiency theory, although helpful for understanding how worry can affect concentration and memory, does not adequately account for students who can work through tasks effectively in high states of worry and anxiety. Attentional control theory (Eysenck et al., 2007) explains this by drawing on the deficient inhibition mechanism (Hopko et al., 1998), which is the ability to regulate how attention is drawn to 'task-irrelevant' information. Students who have a strong deficient inhibition mechanism can overcome high anxiety by ignoring distractions, allowing space in the working memory for processing relevant information and concentrating on set tasks. Empirical research partially supports this theory, with studies showing that high anxiety reduces both processing efficiency and participants' ability to ignore distraction stimuli (Cocks et al., 2016).

However, there is disagreement about the effect of anxiety and distractions on working memory and accuracy. Some studies report increased errors (Ansari et al., 2008; Wieser et al., 2009; Sluis et al., 2017) while others determine no significant difference in accuracy (Cocks et al., 2016). Further contradicting attentional control theory, evidence shows some high anxiety students, although requiring longer to complete tasks, do so with greater accuracy than low anxiety students (Coombes et al., 2009). Here, working memory may be slowed by distractions but students appear to be able to regulate well enough to refocus and complete tasks set, even when experiencing anxiety.

Students' ability to self-regulate and manage their attention, concentration, and direct effort is a primary factor in how well individuals respond to anxiety and worry (Eysenck and Calvo, 1992; Cocks et al., 2016); understanding how self-regulation feeds into learning and how it can be developed is important when considering support for high anxiety students. The next section will explore self-regulation and seek to understand the impact of high and low self-regulation on student anxiety and learning strategies.

2.2.1 Self-regulation

Students who exhibit high levels of self-regulation are defined as 'metacognitively, motivationally, and behaviourally active in their learning' (Zimmerman et al., 1992). This concept of self-regulation was conceived in response to behaviourist theories, offering an opposing view to beliefs that behaviour can be controlled purely by extrinsic reinforcement (Skinner, 1985). Self-regulation sees the learner as the authority on their learning process, regulating their own emotions, thoughts, actions, and behavioursto some extent (Bandura, 1986).

Fredrickson (2003) suggests that the ability to self-regulate is key to employing processes such as goal setting and understanding task value, and developing positive psychological mindsets such as optimism and self-belief, which can help reduce anxiety (Britner and Pajares, 2006). Drawing on the theory of positive behaviour cycles (Zimmerman, 2013),

Fredrickson (2003) identifies a loop whereby positive emotions allow regulation, which supports self-efficacy, a higher chance of success, and encourages further positive emotion. The learner themselves, and the control they have over their processes and thinking patterns has a wide-ranging effect on their approaches to learning and self-beliefs (Stankov et al., 2012). Furthermore, Boekerts et al., (2000) highlight how these positive cycles of feedback are adjusted by students as environmental, personal, and behavioural factors change, with high levels of self-regulation allowing for 'covert self-regulation' through unconscious adaptation.

Recognising that internalised emotions, values, and thoughts of learners form the make-up of self-regulation, the ability to self-regulate was deconstructed into subprocesses that acknowledge how these factors contribute to self-regulation (Zimmerman 1990; Cetin, 2007). Zimmerman (1990) suggests the self-oriented feedback loop of: self-observation, self-judgement, self-reaction, and self-evaluation that combine to form broader processes of reflection, comparison with others, and progress, all feeding into one's ability to self-regulate. Breaking self-regulation into these four processes signifies the importance of learning activities that promote reflection and self-knowledge.

2.2.2 The impact of self-regulation

The benefits of developing self-regulation are thought to be lifelong (OECD, 2015) while disadvantages associated with low self-regulation are many, including impacts on health and financial security (Putwain et al., 2016; Herndon, 2017). These broad positive outcomes of high self-regulation, seen in academic success, motivation to learn, and high attendance (OECD 2013) are encouraging. However, to understand how self-regulation can be developed in students or how self-regulation relates to student anxiety, it is necessary to explore the intrapersonal effects of self-regulation. Further justifying this exploration, Shores and Shannon (2007), while finding no significant relationship between self-regulation and attainment, did however find that low levels of self-regulation occur alongside high levels of anxiety and worry.

Zimmerman and Martinez-Pons (1992) suggest it is necessary to consider self-regulation alongside self-belief, referring to self-regulation as 'efficacy for self-regulation' and that a student's belief in their ability to self-regulate affects responses to learning. So, while students with high self-regulation may gain better academic grades than those with low self-regulation, according to Zimmerman and Martinez-Pons it is the effect of self-regulation on self-belief that underpins how students employ regulation in their learning.

An alternative perspective, drawing a more direct line between low levels of self-regulation and anxiety, is that self-regulation is a strategy students use to manage challenging situations proactively (Aspinwall and Taylor, 1997). This view proposes that students with low levels of self-regulation lack helpful strategies and find themselves overwhelmed more quickly than a student with high levels of self-regulation, resulting in maladaptive outcomes and anxiety. Previously discussed processing efficiency theory and attentional control theory (Eysenck and Calvo, 1992; Eysenck, 2007) see this connection the other way around, with self-regulation as a tool that mitigates anxiety and subsequent worry, with anxiety as the root cause. However, if we consider the cycle of anxiety, worry, and low self-regulation, these may continually feed into each other, like the positive behaviour cycle proposed by Zimmerman (2013), making it difficult to identify the beginning of the cycle.

Drawing parallels with the deficient inhibition mechanism (Hopko et al., 1998), Morosanova and Fomina (2017) add another dimension to the connection between self-regulation and anxiety. In a study involving 16 – 18-year olds, they found that high levels of self-regulation act as a mediator for the detrimental effect of anxiety on attainment. This calls into question the belief that low self-regulation directly correlates with anxiety (Shores and Shannon, 2007), instead suggesting that high self-regulation can occur alongside anxiety, seen via anxious students' ability to ignore distractions.

That high anxiety can be mediated by self-regulation is encouraging for schools seeking to address the negative impacts of anxiety. While reducing anxiety itself would be positive for students, work to improve self-regulation alone might positively influence outcomes for students. Research tends to agree that anxiety results in cognitive and affective reactions, with debate as to how these interact and overlap (Henschel and Roike, 2016). Having considered cognitive responses to anxiety, and to help gain a fuller picture about the impact

of anxiety on students, the next section will seek to understand the affective responses to anxiety and any associated learning dispositions.

2.3 Affective effects of anxiety

The affective dimension of anxiety is often called emotionality (Dowker et al., 2016, Henschel and Roike, 2016) with emotional responses occurring as automatic reactions to tasks or to the outcomes of the tasks (Liebert and Morris, 1967; Henschel and Roike, 2016). For example, affective responses can include enjoyment, nervousness, or tension, and differ from cognitive responses such as worry because of their immediate and often unconscious nature.

Affective responses can be positive, such as enjoyment, however many affective responses to anxiety, whether mathematics or general, are thought to be negative and elicit nervousness, tension, or fear in students (Henschel and Roike, 2016 pp1). Minihan et al., (2021) argue that affective responses can manifest as physiological symptoms such as dizziness and nausea, with emotions directly impacting physical reactions to high anxiety situations. These are examples of the more observable symptoms of anxiety highlighted by Minahan and Rappaport (2012), which help teachers identify possibly anxious students. However, students may also try to hide anxiety, particularly if this is related to judgement from peers, which can lead to embarrassment about symptoms (Layne et al., 2006) and possibly provoke distracting maladaptive behaviours (Atkinson, 1974). As such, teacher awareness of possible symptoms and behaviours associated with anxiety is crucial, if students are to be helped to manage their anxiety (Layne et al., 2006).

As with the cognitive response of worry, affective or emotional responses to anxiety are detrimental to student performance (Pekrun et al., 2002). Just as students experience cognitive thoughts when anxious about a task, students will also experience affective reactions, but while cognitive thoughts are influenced or mediated by self-regulation (Cocks et al., 2016), affective reactions are tied to self-efficacy (Bandura, 1993; Pekrun et al., 2002; Pekrun, 2006). Hirvonen (2013) explains the relationship between affective anxiety and self-efficacy as one initiated by feelings of low self-efficacy whereby students have little belief in

their control over a task or an outcome, which creates anxiety with emotions of fear, tension, or nervousness.

However, how affective and cognitive responses to anxiety interact is not yet fully understood. Supporting the concept that cognitive and affective responses influence one another, Desideri et al., (2019) found that heightened anxiety corresponded with low self-efficacy in the form of low self-belief and low self-worth and that subsequent 'mind wandering' turned into cognitive worry. This illustrates how the affective and cognitive components of anxiety might feed into one another and result in dysregulated behaviours previously considered to be cognitive based (Aspinwall and Taylor, 1997).

Adding to the difficulty of separating cognitive and affective responses in theory, much research examines the effect of anxiety as an overall sum, combining affective and cognitive responses into a total score. This is often to determine the effect in academic performance (Ashcraft and Kirk, 2001, Levine and Beilock, 2013). Attempts to dissociate between the constructs found that cognitive responses to anxiety were more negatively associated with performance than affective responses, implying worry has a more pronounced impact on attainment compared to emotions such as nervousness or fear (Hembree, 1988). Different correlations with performance does not, however, mean affective and cognitive responses are discrete. It can still be true that emotions lead to worry and stronger cognitive reactions (Hirvonen, 2013; Desideri et al., 2019).

Another perspective on how affective and cognitive responses interact is that intrusive thoughts and cognitive processes feed into emotional responses, which then impact working memory and contribute to poor regulation (Carey et al., 2016). This argument sees cognitive and affective responses as continually feeding into one another but, contrary to research that suggests emotions initiate negative responses (Hirvonen, 2013; Desideri et al., 2019), here we see cognitive thoughts beginning a negative cycle.

The role of positive emotions when manging anxiety, such as confidence and self-belief, is widely considered to provide a boost to the cognitive resources of perseverance and strategic thinking seen in students with high levels of self-regulation (Pekrun et al., 2002; Sabourin and Lester, 2014; Verkijika and De Wet, 2015). This aligns with the theory that

students low in self-belief experience diminished self-worth in the face of tasks they believe are out of their competency, leading to worry and further reduction in self-belief (Bandura, 1993).

Agreeing with the focus on positive emotions as a fundamental part of reducing anxiety, research shows that low anxiety students have greater affective control, meaning these students can regulate their emotions more consistently than students with high anxiety (Minihan et al., 2021), drawing in positive emotions more readily. The reference to 'regulation of emotions' further confirms the complex interplay of cognitive and affective responses, with cognitive thinking playing a part in controlling or promoting certain emotions and leading to questions about what comes first: emotion or thinking (Carey, et al., 2016).

Affective responses to anxiety may initiate cognitive reactions, occur in parallel, or be the result of cognition (Pekrun, 2002; Carey et al., 2016). While there is debate as to how reactions to anxiety interrelate, low self-efficacy is consistently observed in students with high anxiety (Pekrun, 2006; Desideri et al., 2019) while high self-efficacy is observed in those with low anxiety levels (Hirvonen et al., 2013; Verkijika and De Wet, 2015). The emphasis on self-efficacy and self-belief across several studies and theories merits a more detailed exploration of self-efficacy, summarised in the section below.

2.3.1 Self-efficacy

Self-efficacy is an individual's belief that they can carry out a task and that they are capable in a given situation (Street, et al., 2017). This belief involves cognitive judgements about one's own personal capacity (Zimmerman and Cleary, 2006) and has roots in Bandura's (1986) social cognitive theory, whereby learners' development is influenced by reciprocal interactions between the social and physical environment and a learner's thought processes. According to Bandura (1986), the development of self-efficacy specifically is thought to involve the personal interpretation of information from four sources: mastery experience, vicarious experience, social persuasions, and physiological states.

Research and theory into self-efficacy spans decades and, despite variations in definition, there is consensus that self-efficacy is founded in a self-belief (Bandura, 1986; Tierney and Farmer, 2002; Zimmerman, 2003), and that this self-concept has strong connections to other dispositions, academic attainment, and emotional states (Putwain, Sander and Larkin, 2013; OECD, 2020; Lin, 2021). Students with high self-efficacy for learning tend to employ strategies to problem solve (Zheng et al., 2018), and are more likely to exert effort to complete work (Britner and Pajares, 2006; Kiran and Sungar, 2012).

Students displaying lower self-efficacy may not reach their full potential due to a lack of self-belief (Bandura, 1986), possibly undermining their own aspirations by avoiding activities and learning (Wigfield and Eccles, 2000; Bandura et al., 2001). In the classroom low self-efficacy can be observed through passive or active avoidance such as refusing to begin a task or leaving the classroom (Atkinson, 1974). Looking at the positive elements of self-efficacy, Zimmerman (2013) suggests that high self-efficacy creates a self-fulfilling cycle of reinforced belief in effort, as students have the belief to attempt work, ask for help, and eventually understand challenge problems.

Considering Dweck's (1985) work on learned helplessness, where students develop the belief that they are not capable and therefore employ less effort in their learning, we may infer that the converse to Zimmerman's positive cycle is also true. Students who have low self-efficacy can also experience a cycle of self-belief, effort, and success but, in this instance, low self-belief leads to lack of effort, perceived failure, and further lower of self-efficacy.

2.3.2 The impact of self-efficacy

While the development of self-efficacy is complicated, stemming from multiple personal, environmental, and social sources, the impact of self-efficacy on learning is widely acknowledged to be profound, influencing motivation, academic attainment, future career potential, anxiety, and mental health more broadly (Wigfield and Eccles, 2000; Muris, 2001; OECD, 2003; van Dinther, Dochy and Segers, 2011; OECD, 2020).

Although several studies have correlated high self-efficacy with improved attainment (OECD, 2003), often using interventions and small group work (Margolis, 2005; Feldman, Kim and Elliott, 2011; Wang and Lu, 2020), this connection may not be directly causal. Self-efficacy, while impacting observable attainment scores has also been seen to influence the learning processes leading up to a test score or grade. Highly self-efficacious students tend to demonstrate higher level reading and writing skills than those with low self-efficacy (Prat-Sala and Redford, 2010) and approach learning with a growth mindset (Dweck, 1985). Students self-reporting high levels of self-belief showed high levels of focus and a desire to learn instead of finishing a task (Usher, 2009; van Dinther, Dochy and Segers, 2011).

Self-efficacy is a student's belief in self-competency and supports effective learning but the formation of high levels of self-efficacy is seen by many students to be a result of teaching (Street et al., 2017). Students credit teachers for developing the opportunity for learning, suggesting trust in the teacher may play an important part in the learning process, irrespective of high or low self-efficacy. This is supported by research involving small group interventions, where students cite a positive relationship with the teacher and a sense of belonging as important factors in their learning and self-efficacy (King-Sears and Strogilos, 2020).

A recent summary of research into anxiety and attainment in mathematics reiterates the role of the teacher more broadly. Across data from over 1 million students, confidence in the teacher was self-reported as one of the most influential factors in reducing student anxiety (Lau et al., 2022). If we understand high anxiety as related to a lack in confidence (Hasty et al., 2021), for students to develop confidence or belief in their own abilities, teachers also need to instil confidence in their methods or through their approaches to instruction.

Further, looking more closely at the common connection of high self-efficacy and attainment, research recognises the importance of effort for turning self-efficacy into effective learning (Britner and Pajares, 2006; Kiran and Sungur, 2012). Through self-reporting questionnaires, it is possible to see how high self-efficacy results in perseverance, hard work, and increased confidence, and how students reporting low self-efficacy tend to avoid work and experience increasing anxiety. The interrelation of self-efficacy and self-

regulation, seen via perseverance in the face of difficulty, supports previously discussed research connecting cognitive and affective reactions to anxiety, where low perceptions of self-belief interact with thoughts of worry to cause dysregulation (Hirvonen et al., 2013).

Zimmerman (2013) agrees that self-efficacy beliefs are also strongly related to self-regulation, with one construct influencing the other to create a cycle that, when positive, can lead to improved self-efficacy and self-regulation. However, when self-efficacy beliefs are low, students believe there is little point investing time and effort on an activity (OECD, 2013), discouraging future effort and reducing the chance of academic success. This proposed effect of low self-efficacy is supported by growth mindset theory, with students developing learned helplessness because of low self-belief, which feeds into poor regulation such as avoidance (Dweck, 1985).

Although researchers tend to agree that self-efficacy and self-regulation co-exist, many studies and theories fail to identify the direction of influence. Bandura (1995), challenges this failure, arguing that self-regulation is the result of self-efficacy and that a student with higher belief in their capacity is more likely to show high levels of self-regulation by investing time in a task and persevering. Looking at self-efficacy as a starting point, the effects of low self-efficacy extend beyond self-regulation and impact students' wellbeing (Consolazio et al., 2021).

A recent study found that 11–16-year-olds who have lower self-efficacy are more susceptible to poor mental health (Consolazio et al., 2021). The increased levels of stress and depression align with earlier findings of Schunk (1981), and co-exist with reduced aspiration, also drawing on the theory of learned helplessness (Dweck, 1985). Encouragingly, in the 2021 study, higher levels of self-efficacy were found to act as a protective factor for poor mental health, measured by assessing children before and during the covid-19 pandemic. This suggests that working to improve self-efficacy benefits an individual's wellbeing and the ability to regulate responses to anxiety in times of high stress. As chronically low self-belief can impact mental health and progress in school (Putwain et al., 2016), it is helpful to understand how interventions can work to develop protective resilience through confidence, self-efficacy, and management of anxiety.

2.4 Interventions to reduce the impact of anxiety

As schools have both a pastoral and academic responsibility for the students, working to reduce negative responses and effects of anxiety is a priority for many institutions. These responses have been categorised as cognitive and affective, which interact with self-regulation and self-efficacy. As research commonly finds self-regulation and self-efficacy are closely associated, and improvements in one can trigger improvements in the other (Peng and Wang, 2020), interventions considered below include improvements to these two constructs, alongside how to develop positive responses to anxiety.

Lau et al., (2022) agrees with the argument that teacher interaction is key for reducing anxiety (MacPherson, 2016), finding that poor instruction increases anxiety and negative affective response. Positively, interventions designed to improve communication and relationships in the classroom demonstrate how student anxiety can be reduced using careful teacher interactions (Florescu and Pop-Pacurar, 2016; Vehkakoski, 2020), which King-Sears and Strogilos (2020) suggest fosters security, belonging, and self-efficacy.

Teachers have been able to disrupt negative thoughts, that either result in or are caused by anxiety, by countering displays of low self-regulation and self-efficacy with positive examples of success and offering praise for earlier efforts. Vehkakoski (2020) specifically found students displayed greater optimism and self-efficacy, reduced anxiety, and reduced negative affective responses such as fear, when teachers corrected negative thoughts in small group settings. Success orientation can therefore be a helpful alternative response to anxiety, also supporting improved self-efficacy and self-regulation (Martin and Marsh, 2003). Further evidence across 61 schools shows small group work has wider benefits beyond attainment, influencing increased confidence and self-efficacy (EEF, 2014), in turn supporting positive learning attitudes.

Small group learning is increasingly used within schools with students of all ages, often with the goal of increasing engagement and active participation (Dreyfus, 2002). The use of collaboration helps promote deeper cognitive understanding, or mastery (Myers and Lamm,

1997; Martin and Marsh, 2003) through understanding multiple methods to solving a problem and the importance of different perspectives. Stankov et al., (2012) identifies this focus on process over outcome as supporting students to feel a sense of control over their thinking and aiding self-efficacy, which helps students manage affective responses to anxiety (Hirvonen, 2013).

The case for small group interventions that centre on mastery over outcome is furthered by Brophy (2005), who agrees with achievement theory, that a focus on results can negatively affect self-worth (Atkinson, 1974; Covington, 1982). This increases general anxiety by creating competition among peers and increased worry about 'looking dumb' that can lead to maladaptive behaviours (Micari and Pazos, 2014; Cano et al., 2017). Schunk (1989) adds further caution to the use of small groups, arguing that while peer comparison can be helpful for problem solving, any perceived failure in a small group may lead to negative consequences such as increased anxiety or fear of failure.

However, where an intervention is focused on malleable intelligence and mastery, small group work has been successful. Students demonstrated reduced anxiety after participating in discussions about reasons for success and failure and developed ways to articulate their anxieties (Micari and Pazos, 2014), bolstered by the positive peripheral consequence of improved confidence (EEF, 2014). This is supported further, with practical research agreeing that high anxiety causes poor regulation but that interventions designed to intervene positively and build awareness of anxiety significantly improve how students experience anxiety (Apostolidis and Tsiatsos, 2021).

2.5 Conclusion

To better understand anxiety in students, I looked first at how we define anxiety and found anxiety commonly referred to as general anxiety or mathematics anxiety. Understanding anxiety of all kinds as persistent apprehension or fear, general anxiety relates to a tendency towards anxiety in everyday life while mathematics anxiety is defined as anxiety concerning any situation requiring numeracy.

Secondly, I sought to understand the causes of anxiety and found that anxiety can be heightened due to parental attitude, teacher interactions and too great a focus on outcomes over learning. Students in a result-driven environment may see peers as competition more than when mastery is the goal of learning, and with this competition comes fragile self-worth and fear about perceived failure.

Thirdly, I wanted to understand the effects of anxiety on students. Research showed that anxiety provokes either cognitive or affective responses in students, although there is debate about how these effects interact. Cognitive responses such as worry are thought to overload memory and hinder learning. This response can lead to poor self-regulation as students seek distraction or to reduce the worry and anxiety. Affective responses such as nervousness or tension are often observed alongside low levels of self-efficacy or self-belief, leading to learned helplessness and a lack of effort, particularly when work is difficult.

Finally, I wished to understand how to help students manage anxiety to minimise the impact on their learning and wellbeing. Positive teacher interactions that promoted confidence and encouraged students to articulate concerns were shown to be effective at reducing anxiety itself, while a focus on effort and mastery were seen to help students' self-efficacy and management of anxiety. Building trust in the teacher and reducing competition among peers was also associated with reduced anxiety, a sense of belonging, and improved self-regulation, all helping students focus and make the most of their learning.

Considering my intervention, I believe a focus on positive teacher and peer interactions, combined with activities designed to promote mastery and effort can be effective at helping students manage their anxiety and responses to anxiety. Intervention sessions will be built around purposeful discussion of learning-related concerns, helping students identify and articulate any anxiety to understand how to manage responses.

Research Questions

These three questions will guide my research as I seek to understand the impact of my intervention:

1. How do students describe their anxiety?

2. How do students describe the responses they have to anxiety?

3. In what ways has the intervention helped influence student management of, and responses to, anxiety?

3.0 Methodology

After reviewing the literature, and in my role as the school lead on interventions post-covid, I decided to plan sessions that would cover missed curriculum content and would also focus on managing anxiety and responses to anxiety in learning. It was my responsibility to develop sessions, decide on content, and train teachers in the delivery of intervention sessions. The intervention was then used as the basis of this research paper, assessing anxiety and associated constructs before and after the intervention.

The sessions occurred twice weekly for five weeks and initially centred on mathematics with a view to wider school delivery. I included the whole school in the development and review of this research, gained colleague perspectives and worked closely with my fellow intervention teacher, Astrid, to plan and reflect on sessions (appendix L) . At the beginning of the academic year, I was briefed by the headteacher that there would be a minimum of two half terms to deliver interventions, with four small groups of four to six students taught in each half term. The opportunity to complete a half term cycle of intervention, review, and complete another cycle lent itself to action research, which is discussed below.

3.1 Action Research

Action research aims to address local issues raised by individuals or groups in a setting (Kemmis and McTaggert, 1992), which aligns with this intervention, based on feedback from teachers that students appear to be struggling to regulate themselves in lessons. Students have also self-reported feeling anxious and responses to this such as wanting to avoid lessons or school.

Ferrence (2000) agrees with Kemmis and McTaggert (1992) that teachers work best on local problems that they have identified themselves and, as identified by Watts (1995), teachers become more effective when collaborating, evaluating, and assessing their own work. This collaborative approach may also help bridge the gap between research and practice (Somekh, 1995) with the space to plan, act, observe, and reflect, as is required in action research (Kemmis and McTaggert, 1992) before adjusting methods for the next cycle.

There are various proposed models for action research design, with debate as to the appropriate number of stages involved. Zuber-Skerrit (1996b) agrees with Moroni (2011) that the cycle should include problem diagnosis, panning, action, assessment, and then critical reflection and communication. Meanwhile, Cohen et al., (2018) propose a more detailed model (figure 1), emphasising discussion and collaboration throughout. As I plan to collaborate at all stages this will be used to frame my intervention development and review.

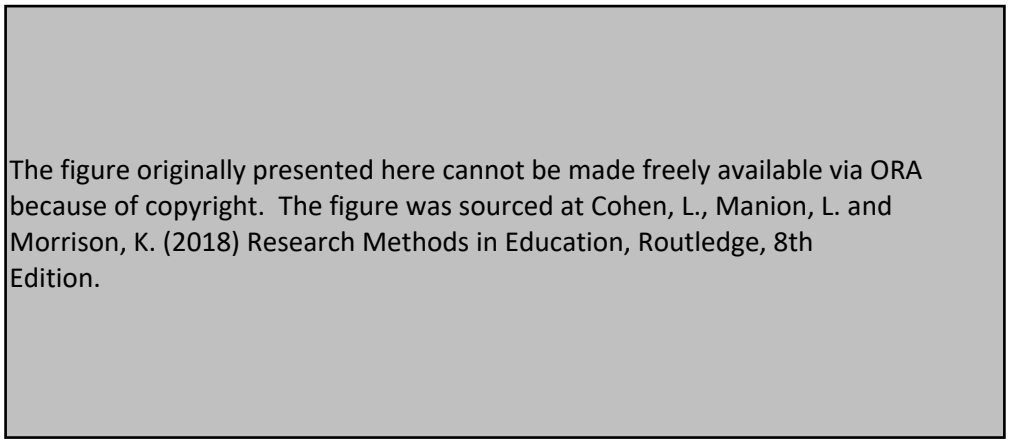


Figure 1: the action research cycle (Cohen, Manion, and Morrison, 2018).

Using the chosen model of action research above (Cohen et al., 2018), I identified the problems thus: 1. teachers reported disengaged anxious students with poor self-regulation and self-efficacy and 2. students reported heightened anxieties about learning. My aim was to understand the anxieties of students and reactions to these anxieties. I also aimed to understand how small group intervention influenced students' reactions to anxiety, with the intention of promoting self-knowledge to enable students to better manage anxious feelings. Through collaborative planning with Astrid, the intervention was planned with the above aims as success criteria.

Aligned to action research theory (Kemmis and McTaggert, 1992), we gathered students' self-perceptions before and after the intervention to assess responses to intervention work and amend practices for the next cycle of research. This cyclical method of reflection and amendments was embedded in weekly discussion with colleagues, sharing reflections on student responses and comparing observations about students (appendix L).

Further justifying the use of action research, the present study sought to address practical problems and expand knowledge (Hult and Lennug, 1980, pp.214 – 50), with collaboration and critical reflection weaved throughout the interventions (Zuber-Skerritt, 1996b, p.85). Furthermore, as emphasised by Ferrance (2000), this work was planned to evolve during the process, improve the quality of human actions, and to understand complex social situations.

3.2 Research Methods

Researchers and teachers can only observe student behaviours and make assumptions based on their interpretation (Campbell, 2011) therefore using self-reporting methods to elicit students' experience and responses to anxiety was appropriate. To gain a fuller picture and triangulation of data, Astrid and I planned open questions for use in group interviews, deciding against closed questions that can encourage less considered responses (Krosnick and Presser, 2010).

Self-reporting questionnaires

Although open questions can cause difficulty in analysis with several different answers, we considered this worth the effort given the small number of students and understanding that open questions can lead to more authentic information (Cohen et al., 2018 pp.475). We were also aware that students may leave responses incomplete or overlook instructions because the questions required more thinking than closed or multiple-choice questions (Redline et al., 2012). We planned for this by consulting teachers on the wording and keeping the number of questions low so this could be completed within 15 minutes. Furthermore, each question was carefully framed to align with the research questions (Wilson and McLean,1994) reducing the chance of students responding in ways that do not inform the research aims (Cohen, 2007).

There are also issues to consider when using self-reporting questionnaires. Although students provide their own account of feelings and reasons, this may not be consistent with actual feelings and real reasons. Students completing the questionnaire in the presence of

the teacher may feel influenced into answering in certain ways (Cohen et al., 2018 p. 502). Alternatively, students may wish to please the teacher or feel instrumental motivation, expecting a reward such as praise (Pedder and McIntyre, 2006). To mitigate these disadvantages, students in this research were informed that there was no reward for participating and no penalty for withdrawing or not completing. However, students may still have felt some desire to please the teacher and provide certain answers that did not reflect true feelings.

Focus group Interviews

Group interviews were held after the intervention sessions and chosen to provide an opportunity to delve deeper into student responses to questionnaires. The focus group questions in this study were devised from questionnaire responses.

Interviewers are either 'miners or travellers' (Kvale, 1996) exploring an issue more freely than through a questionnaire. I used a semi-structured approach to balance mining and travelling, using the responses from questionnaires to help frame topics while allowing some scope for exploration where this feels fruitful. Group interviews are also helpful for providing more detail as students are prompted by one another's responses (Arksey and Knight, 1999) and the process can help explore previous questionnaire responses (Kerlinger, 1970). Additionally, interactions with others may make the interview more enjoyable for students, although the power dynamic between students and with the teacher needs to be considered and mediated to allow all students to express themselves openly (Somekh, 1994).

Other disadvantages of group interviews can be the domination of direction and response by certain students, possibly leading other students to become passive to avoid contradicting more vocal students. As interviewers it was my and Astrid's duty to ensure all students could be vocal and we did this by setting some ground rules prior to the interview. We were aware students do not commonly participate in interviews so reminders of active listening, not interrupting, and waiting for interviewers to say when people could talk was

helpful. This also helped when creating a clear transcript of the interviews. Group interviews also risk teacher bias (Cohen et al., 2018) so we chose a semi-structured approach, which helped reduce bias by keeping the thread of the interview tied to the research questions. We also planned possible follow up questions to remove bias in how interviewers asked for more detail (appendix A).

3.3 Research Instruments

Self-reporting questions

We wanted to encourage students to give their own opinions and express thoughts using their own words. Long questionnaires result in fatigue (Redline et al., 2012; Champagne, 2014) with students possibly giving up or giving incomplete responses, so the number of questions was set at seven and the completion time tested to be a maximum of 15 minutes. Astrid and I both took the questionnaire within 10 minutes, adding on five minutes to allow extra time for students.

I worked with Astrid to devise an original questionnaire (appendix A) because often-used measurements of anxiety, self-efficacy, and self-regulation use ratings scales, which do not provide the depth sought here (Sherer et al., 1982; Schwarzer and Jerusalem, 1995; Chen et al., 2001). The work of Carey et al. (2017), Cano et al., (2017), and Chen et al. (2001) fed into the construction of my questions, as we used their granular, closed questions to build broader open questions.

Bearing in mind the intervention was intended to extend beyond mathematics, we devised pilot questions that were not subject specific. Therefore, anxiety questions were based on anxiety scales used by Cano et al., (2017), although instead of asking the closed question 'mathematics usually makes me uncomfortable and nervous', the question was framed as 'What activities in lesson make you feel anxious? Why?'. This was followed with 'what do you do to reduce anxiety if you feel it?', which was intended to lead into exploring reactions to anxiety more closely, before questioning how reactions tie into self-regulation and self-efficacy.

Questions related to self-regulation: 'what do you do to maintain concentration?' and 'what might cause you to lose concentration?' stem from reading the Self-Regulation Profile of Learning Activity Questionnaire (SRPLAQ) used by Morosanova and Fomina (2016). This questionnaire uses scales to assess how students manage mistakes and the effect of different distractions. As such, self-regulation questions were designed to be broad, in line with the aim of gathering students' views with minimal teacher interference or leading. While the literature suggests that working memory plays a part in self-regulation, and connects concentration and anxiety (Eysenck and Calvo, 1992), measuring memory was ruled out as too complex for this current research. Therefore, concentration and effects on concentration are the decided factor through which self-regulation will be discussed.

Questions related to self-efficacy were based on another rating questionnaire aimed at understanding self-efficacy by considering goals and difficult tasks (Chen et al., 2001). The teachers in my schools had raised particular concern over how students struggle through challenging work, so questions were framed to address that aspect (appendix A).

The order of questions was chosen carefully, heeding advice of Cohen et al., (2018 pp. 492) that the first questions set the tone of the questionnaire. Our work was focused on understanding anxiety and as such it felt important to have this theme at the start of the questionnaire. Therefore, the questions were set in the order of anxiety, self-regulation (considering concentration strategies), and self-efficacy (considering the management of difficult questions).

Group Interview Questions

The interviews were framed with semi-structured questions designed to draw out students' perceptions about their anxiety, how this affects learning, and their own self-regulation and self-efficacy (Appendix A). We prepared possible follow up questions to help maintain the focus on these constructs and to gather more detailed insight from students. These questions were planned to be open, asking 'why' and 'tell me more' to encourage students to use their own words.

Coding

Analysing the qualitative data from questionnaires and interviews, I heeded the advice of Creswell (2012) and read the whole set of responses through several times to develop a full picture of the key issues and strategies mentioned. I then read the responses and counted the frequency of key words that appeared such as 'listen' or 'judgement' in response to each question. The questions were themed as belonging to either anxiety, self-regulation, or self-efficacy although I was aware responses may overlap, for example anxiety being mentioned as a reason for less strong self-efficacy.

The themes within each question supported thematic coding so I reviewed the data several times to ensure accuracy with counts and themes, searching for overlapping codes and eliminating these (Miles and Hubermann, 1994). Participants may use different words to mean the same thing, so I was careful to interpret words in code using context (Cohen et al., 2018). For example, student G writing about anxiety: 'I feel self-conscious when in a class'. This suggests a fear of judgement or anxiety about perception and was coded as 'peers', despite peers not being explicitly mentioned. Another concern about coding is that this strips context from the data, so I included verbatim responses from questionnaires and interviews within the findings (Blikstad-Balas, 2016 p. 9) to help add context and illustrate points more clearly.

Dividing responses into coded themes allowed me to check pre- and post-intervention responses for trends in anxiety, self-regulation, and self-efficacy. To present the data clearly, I used tables to cross-reference anxiety responses with self-regulation and self-efficacy (appendix D), and each table is clearly titled with the question posed to students.

3.4 Pilot

The first cycle of interventions took place in October 2021 and as suggested by Owen et al., (2016) reflected on the questionnaires at the end of the cycle. Astrid and I chose to use this cycle as a pilot, knowing that we had another cycle planned with potentially more cycles in

future terms. Reflecting on the pilot, Astrid and I had similar experiences with some students fully understanding and engaging with the questions, but some writing one-word responses, not answering questions, or contradicting themselves. As is common in a pilot, we decided some questions needed to be clearer to avoid ambiguity and reordered while not adding to the length of time (Cohen et al., 2018 pp.496).

Pilot responses suggested students may only be providing mathematics anxiety responses so to gain a broader picture an anxiety question was added, giving students space to share mathematics-specific anxiety and then other anxieties. Student contradictions made us consider reorganising the questionnaire to encourage clear thought, which we implemented for self-regulation questions.

From group interview data we found that the loose framework helped students respond freely. However, it was decided a concerted effort needed to be made to prevent individuals dominating the conversations. We therefore placed extra emphasis on reminding students to listen respectfully to all participants and not interrupt others.

3.5 The Intervention

The interventions took place in small groups of four or five. The pilot cycle had 19 students in total while cycle two had 14. All students were between 11 and 16 years old and were provided with 10 sessions across five weeks.

The intervention was designed to include learning that was missed during covid-19 home learning as well as the aims of the research. Knowing how key teacher interactions are for reducing student anxiety (Lau et al., 2022), we agreed to use positive language for all student effort and contributions throughout the sessions. The students in these groups were typically poorly regulated in lessons so drawing on research by Vehkakoski (2020) and Apostolidis and Tsiatsos (2021) Astrid and I planned to disrupt students' negative self-talk with positive reminders of previous successes.

Alongside positive interactions and intervening where students began to express negative self-concepts, we wanted to develop students' perspectives of mastery and failure. Having read how self-efficacy and mastery can help manage affective responses to anxiety (Hirvonen, 2013), we chose activities that emphasised mastery by requiring multiple solutions and gave students control over their chosen solutions. The role of mastery in lessons was also planned to reduce fear of failure by reducing the emphasis on outcomes and praising processes and effort (Lei et al., 2021).

All activities were completed with a whole group discussion to understand errors. This was purposefully designed to reduce future misconceptions at the same time as normalising mistakes. Atkinson (1974) suggests pride is at risk when students compare themselves unfavourably with others, which impacts self-worth, anxiety, and can cause avoidance. By collecting the groups mistakes together, all students recognise mistakes as part of the learning process and something experienced by everyone.

Intervention sessions followed the structure below (figure 2), incorporating positivity, effort, mastery and discussion throughout.

Intervention Session Structure: Paired Peer Work

a. Students complete an assigned question/set of questions showing full working and aiming for multiple solutions
   (**self-regulation aim: focus and effort**)

b. Students share and explain their methods with their partner, deciding on the benefits of each solution.
   Students comment positively on each other's work, noting accuracy, method, persistence, clarity.
   (**self-efficacy aim: realising multiple methods)**
   (anxiety aim: reduce fear of failure).

c. Students receive the teacher solution to allow checking for accuracy
   (**self-regulation aim: error checking**).

d. The whole group debates which solution is best. Teacher actively praises the variety of solutions,
   (**self-efficacy aim: knowledge that different approaches are valid**)
   (**anxiety aim: build teacher trust and confidence)**

e. The whole class lists common errors found in everyone's work
   (**anxiety aim: normalising mistakes and reducing anxiety and fear**).

Figure 2: the intervention structure for each session, detailing the ambition of each activity

3.7 Ethical Considerations

Alongside the necessary CUREC approval, given before any research began, parental permission was sought alongside participant permission, as students were under 18. Participants were made aware that they could withdraw at any point without penalty. Parents and students were written to stating guaranteed anonymity and explaining that only data relevant to the research would be collected. No data on student background, gender ethnicity or age was recorded.

The content of the questionnaire and group interview was considered carefully. No questions were designed to cause distress, however we cannot predict how students will feel or what might prompt an upsetting emotion in a participant. The construct of anxiety was discussed with students before the research began and students were reassured that they could discuss any concerns with the school counsellor. I had approached the school counsellor prior to selecting students, taking advice on student suitability. The counsellor was aware that students had been told they could ask for extra support.

The questionnaires and interviews needed to be conducted efficiently and not result in any further loss of learning. We discussed the length of the questionnaires and how beneficial this style of reflection and discussion would be to student learning, deciding that questionnaires should take a maximum of 15 minutes to complete, and interviews would be conducted out of lesson time.

3.8 Limitations

This research has several limitations that mean caution must be taken when interpreting and conveying results to colleagues. Firstly, the sample of students is small, at 33 in total, and due to covid-19 staffing and timetabling, all students were either year 7 or year 11. This means it is not possible to generalise findings across the school, and certainly not wider afield.

Another limiting factor is the subject in which the intervention occurred. It was intended for students to receive intervention in English and Modern Foreign Languages (MFL), as well as mathematics. However, due to covid-19 and increased staff absence, these intervention sessions were postponed long-term, further limiting the scope for discussion across the school. This also impacted the extent to which we could collaborate; having intended to work across three subjects, we were now only able to work within one subject department.

The questionnaires used in this study have not been verified as valid instruments. This was known and these questions were chosen with my school and students in mind. This means that there is no possible comparison with previous studies using the same questions, limiting the reliability of results.

3.9 Collaboration

Throughout this research I collaborated with Astrid who ran parallel intervention sessions with the same activities, designed to build awareness of anxieties and responses to anxiety, as well as help students manage the effects on learning. We collaborated weekly to reflect on student progress and observations from lessons. The wider mathematics team and senior leadership were updated regularly and asked for feedback about the participants' approaches to learning in regular mathematics classes and around the school (table 1).

Table 1: showing how I collaborated with colleagues, departments, the wider school, and the trust at stages throughout the intervention and research

	Collaboration	Purpose	Frequency
1	Staff questionnaire: my colleague completed a questionnaire to gain insight into their concerns about students.	Understand concerns beyond my own observations and informal discussions with teachers and students. Building on findings from year two about the impact of anxiety.	Once: Pre-Intervention Planning
2	Departmental briefing: we summarised work in each departmental meeting, reminding staff of our aims and responding to questions about the intervention.	Include the wider team to encourage engagement with research later in the year and gain insight from participants' regular teachers.	Fortnightly
3	Whole school: the whole school was briefed about the research through my delivery of CPD every month.	All staff engaged in the research and literature behind the intervention. This was intended to encourage school-wide research-led interventions later in the year. Staff were able to feed back about students in other subjects, highlighting any notable changes in anxiety, regulation or efficacy	Monthly
4	Intervention planning: Astrid and I planned the peer work together, considering student personalities and using the literature to understand how small group work can develop helpful responses to anxiety.	I was able to compare ideas and have a critical friend to question groupings or activity choices. We were able to build activities that were accessible to students and interrogate the choice of questions in the questionnaire.	Twice: pilot planning and cycle two planning
5	Weekly feedback: Astrid and I reflected weekly on changes in individual students and how to use peer work effectively with new topics.	The sessions for each intervention group were the same in practice, although delivery will have differed slightly. Critical reflection meant the activities were carefully considered and appropriately challenging.	Weekly
6	Pilot review and amendments: the questionnaire and informal student reflections were evaluated, and cycle two instruments altered.	This period of review provided space to consider if the activity and questionnaire needed changing for cycle two. The cycle two questionnaires were amended to remove some ambiguity.	Once: Post-pilot
7	Trust-wide seminar: providing an update on my research to multiple schools and sharing initial findings.	The research and intervention were shared with multiple schools to promote the use of research group and learn about some effective activities for interventions. We wanted to start conversations and initiate cross-school work to develop action research in all schools.	Once

In addition to formal collaboration with Astrid, and the informal discussions with the department, I was also asked to deliver a session to teachers from across the Trust of six schools. In this one-hour session I was able to share my work to date, the research behind the interventions, and engage in some interesting discussions with colleagues from primary, secondary, and pupil referral schools (appendix M). The session prompted wider engagement with research beyond my school, with teachers and support staff volunteering their observations on self-regulation, self-efficacy, and the effect of anxiety in their schools. I agreed, after completion of the research, to share findings through a summary presentation and a section in the staff newsletter, aiming to prompt further research across schools within the Trust.

4.0 Findings

Findings are presented to address each research question in turn. The first research question asked, 'how do students describe their anxiety?' and will be answered using data from question one in the pilot and questions one and two in the second cycle. The second research question asked, 'how do students describe their responses to anxiety?', which is addressed with responses to question two in the pilot and question three in cycle two. Finally, the third research question asked, 'in what ways has the intervention helped influence student management of, and responses to, anxiety?'. Data from all pilot and cycle two questions fed into the answering of this final question.

When responding in questionnaires, students were permitted to, and often did, provide more than one answer to each question, and therefore percentage data to show the likelihood of a certain response often added up to greater than 100%. Percentages represent the percentage of students who responded in line with each specific coding theme for each question.

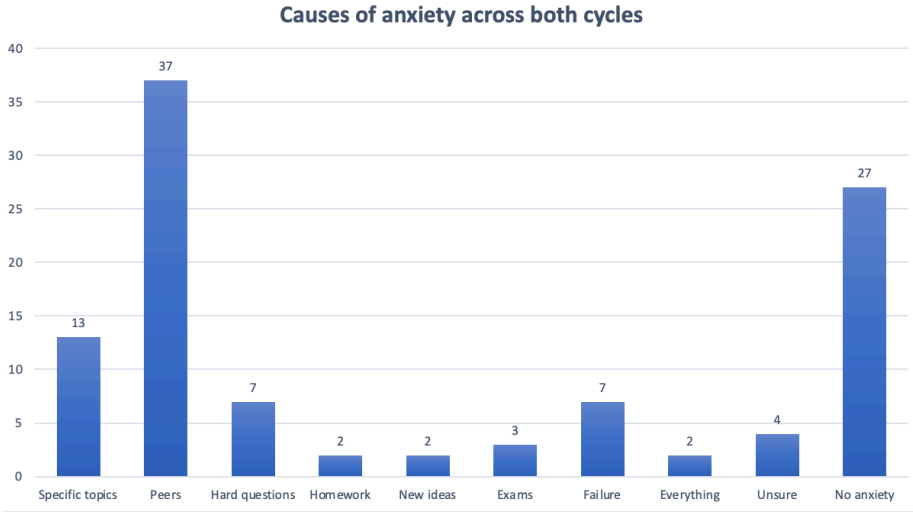
Percentages were chosen to allow comparisons between different group sizes, such as the two different cycles as well as whether students reported cognitive or affective responses to anxiety.

4.1 How do students describe their anxiety?

After coding the data, descriptions of anxiety were assigned to one of the codes depicted in table 2. Students described a range of causes of anxiety across both cycles, the most common being anxiety related to peers, suggesting greater alignment with general anxiety compared to specific anxieties related to mathematics or testing (Carey et al., 2017). 37% of all descriptions of anxiety included an element of peer anxiety (table 2), referencing speaking in front of the class, groups of students, or people they don't know. Some students were able to describe further detail and explain why they believed their peers cause of anxiety. Student C articulated anxiety caused by peers as 'If I am asked a question in class when I don't understand something, I feel anxious because everyone is watching and I don't

want to get the answer wrong or look stupid', indicating, as suggested by Jackson (2003), that the presence of peers can increase students' anxiety about making mistakes or perceived failure.

Table 2: a chart showing the percentage of students citing each cause of anxiety across all questionnaires in all cycles. Total n = 33



27% of the responses asking about the cause of anxiety reported no anxiety at all. However, some students who self-reported no anxiety then described a response to anxiety for the next question, which suggests reluctance to admit anxiety or some internal conflict about whether they feel anxiety or not. Student F writes clearly 'I don't feel anxious', yet their response to anxiety is 'If I do, I try to leave', illustrating how poor self-knowledge can manifest in poor regulation (Zimmerman, 1990), as this student is not yet able to understand their self-judgements or evaluate their own behaviours and thoughts.

The second most common reason for anxiety was described as specific topics, with 13% of responses mentioning this factor as a cause. However, this figure is not consistent across the intervention cycles (appendix E). Pilot cycle students mentioned no specific topics when asked to comment on causes but cycle two students, who were first asked about anxiety in mathematics lessons, did tend to focus on topics as sources of anxiety. Asking specifically about a subject in cycle two appears to have shifted students' focus and description of anxiety differently compared to the pilot cycle, possibly inadvertently drawing attention to

subjects and topics. It is therefore not surprising that out of 13 responses that listed anxiety due to certain topics, 9 of these related to mathematics.

Another key difference between the two cycles of intervention occured around fear of failure. Only pilot cycle students described fear of failure as a key cause of anxiety, in seven out of 38 responses (appendix B). However, zero students in cycle two mentioned fear of failure in either questionnaire, not recognising or volunteering failure as a cause of anxiety at all. In the pilot cycle, fear of failure was often linked to peer judgement as four students (C, F, H and L) described their fear of failure in conjunction with worry about peers. Student D explained this as 'Answering in front of some people. In a big class you don't know who will judge you'.

4.2 How do students describe the responses they have to anxiety?

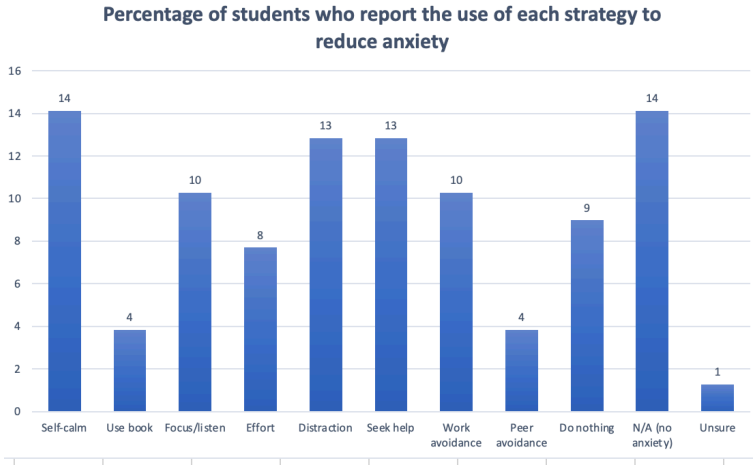
Specific responses to anxiety

Across all cycles and questionnaires, the most common response to anxiety was to self-calm (14%) (table 3). This was predominantly expressed as trying to relax or focus on breathing and was a strategy used by students who expressed a range of causes of anxiety with no clear connection to a specific anxiety cause.

A large proportion of students (14%) stated they had no response (N/A) due to self-reporting that they have no anxiety (table 3). These students who stated no response were separated from students who wrote that they simply did not have strategies, recognising that the absence of coping mechanisms does not mean students think they have no need of strategies. It is possible that some students did not feel comfortable admitting their strategies to the teacher (Lau et al., 2022), as perhaps they employ maladaptive distractions and recognise these are unhelpful for learning. Alternatively, these students may simply be unaware of what they do when anxious. Examples of this are students AA and EE who listed anxiety caused by certain topics but wrote that they did not know how to manage it, or that they would do nothing (appendix B).

Students also reported seeking help (13%) and seeking distraction (13%) as ways to manage anxiety (table 3). Demonstrating elements of self-efficacy and growth mindset (Dweck, 1985), students sought help from peers, as with student BB who would 'ask friends for help', or from the teacher, highlighting how these students have identified that they might be able to understand work with extra support. The two aspects of help (peer and teacher) were combined under the code 'seek help' and also show how some students understand that anxiety can be reduced through admitting they need help and then finding support from others. This behaviour indicates a degree of confidence in others or a sense of belonging (King-Sears and Strogilos, 2020; Lau et al., 2022), where students can be open about anxieties and also trust the support of others.

Table 3: a chart showing the percentage of students citing each response or strategy to manage anxiety across all questionnaires in both cycles. Total n = 33.



Avoidance was also described as a strategy to reduce anxiety, but this referred to two distinct types of avoidance: avoiding peers and avoiding work. These aspects of avoidance are different in how adaptive or maladaptive they are, with peer avoidance often related to adaptively avoiding the distraction of others and work avoidance often considered maladaptive for learning. The two avoidances are therefore listed separately as work or peer avoidance. Few students (4%) cited avoiding peers as a method of reducing anxiety, which is interesting to note as 'peers' was a main cause of anxiety in this research. Work

avoidance often referred to leaving the room or trying to be quiet to avoid being asked to participate, and in all but one instance students also citied peers as a cause of anxiety highlighting how pride attached to peer comparison can be a catalyst for work avoidance (Atkinson, 1974; Covington, 1982). This illustrates the need for teachers to dig beneath the surface of behaviours, (Layne et al., 2006) as while students may be avoiding work and displaying maladaptive behaviours, their reasons for doing so may often have little to do with the work, but rather the opinion or judgement of peers.

Separating the data from the two intervention cycles, cycle two students self-reported greater use of positive strategies to manage anxiety. Perhaps indicating greater self-knowledge and reflection (Zimmerman, 1990), these students were more likely to use self-calming when anxious (29%), compared to 8% in the pilot cycle (appendix F), and also reported they were more likely to seek help from the teacher or peers (21%), compared to 11% in the pilot (table 4).

Table 4: table comparing students' responses to anxiety across both cycles.

	Pilot Cycle n = 19		Cycle Two n = 14	
Strategies in Anxiety Pilot	**Pre and Post Count**	**%**	**Pre and Post Count**	**%**
Self-calm	3	8	8	29
Use book	1	3	2	7
Focus/listen	7	18	1	4
Effort	6	16	0	0
Distraction	5	13	5	18
Seek help	4	11	6	21
Work avoidance	4	11	4	14
Peer avoidance	2	5	1	4
Do nothing	4	11	3	11
N/A (no anxiety)	10	26	1	4
Unsure	0	0	1	4

A large proportion of pilot cycle students (26%) stated they had no strategies to manage anxiety; however, where anxiety was recognised in the pilot, these students were more likely than cycle two students to employ internal task-focused strategies that demonstrated a sense of self-belief, such as using focus/listening (18%) and making more effort (16%) (appendix F). Compared to cycle two students using focus/listening in 4% of instances and 0% stating they use effort, pilot cycle students appeared more aware of strategies they can use independently of others. As predicted by Schunk (1989), this possibly indicates a

tendency to compare against others as these students also appeared less inclined to utilise in peer support.

Cognitive and affective responses to anxiety

Understanding cognitive responses as thought processes and affective responses as emotional, when combining cycles students self-reported cognitive responses to anxiety more frequently than affective, with 52% to 32% respectively (appendix F).

Looking at all data collected, cognitive responses ranged from those who process their emotions and think of ways to manage them, such as student D who wrote 'I listen hard. I know that if I make the most of school time I feel calmer', to those for whom cognitive responses mean worry and are less helpful. Student J explained how they process anxiety about exams or homework, writing 'I don't. I just worry. And start talking' (appendix A). If we take talking to mean off-task talking then this worry has resulted in distracted maladaptive avoidant behaviour. Although maladaptive responses are often unhelpful for student learning, it is somewhat positive and worth noting that students were aware and able to articulate these responses, with only 2% of students stating they were unsure.

Descriptions of affective responses vary greatly between the cycles. Pilot cycle students are largely negative with descriptions suggesting overwhelming emotions such as 'I can't do anything' or trying to leave the classroom (Appendix A). This contrasts with cycle two students who tend towards positive management of emotions and demonstrate self-control in the face of anxiety (Pekrun et al., 2002), using calming methods that focus on breathing.

Also worthy of mention is the difference in 'no response [to anxiety]' between cycles. Pilot students stated they had no response in 12 of 38 questionnaires taken across the 5-week period, while cycle two students reported no responses just twice out of 28 questionnaires (appendix A). The differences in how students responded to anxiety between cycles may be a combination of confidence in the teacher, unintended changes in teachers' explanation of research, or the slight change to questionnaire order that inadvertently encouraged admission of anxiety (Cohen et al., 2018 pp. 492).

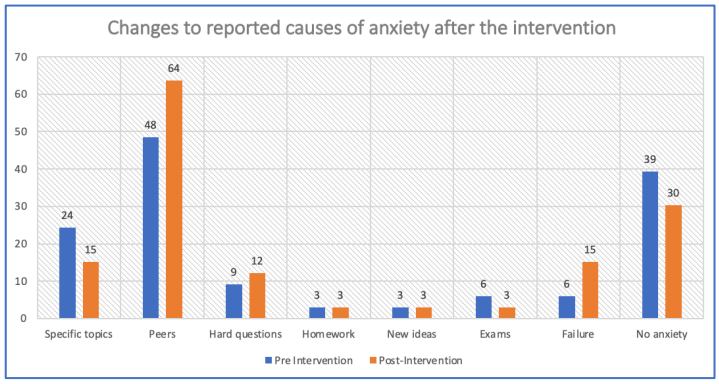
4.3 In what ways has the intervention helped influence student management of, and responses to, anxiety?

Awareness and articulation of anxiety and responses

In both cycles of intervention, several students provided longer, more detailed answers after the intervention, exemplified by student H who, first describing what makes them anxious, said 'Mini tests because I forget everything'. Five weeks later, student H responded with more specific reasons that explained the social context behind their thinking and hint at concerns about the impact of failure on pride (Atkinson, 1974): 'When I have to speak in front of the class. Having to explain an answer but not knowing if I've gotten the answer correct or not. If everyone in the class understands something and I don't' (appendix A).

The percentage of students reporting no anxiety decreased after the intervention, from 39% to 30%, implying an increase in anxiety, willingness/ability to admit to anxiety, or anxiety awareness. After the small group interventions, as proposed by Schunk (1989) and Lei et al., (2021), students also seemed more concerned with peers, referencing classmates as sources of anxiety more often (table 5).

Table 5: percentages of students reporting causes of anxiety pre- and post-intervention. Total n = 33.



Greater anxiety from perceived failure accompanied this increased anxiety from peers, with an increase from 6% to 15% of students, with some students writing that anxiety related to failure is worsened by possible peer judgement.

Strategies in anxiety pre- and post-intervention

Students self-reported a decrease in distraction within cycle two (29% to 7%) while pilot students increased their use, from 5% to 21% (table 6). While this may imply students within the pilot cycle are more off-task post-intervention, comments suggest some students may be using distraction to disrupt negative thoughts or anxiety. This is illustrated with student A who highlighted distraction that can self-handicap the learning process (Dweck, 1985; Cano et al., 2017) 'If I do feel stressed I try to do something fun and relax', while student S 'thinks of something funny'.

Table 6: comparing strategies to manage anxiety before and after the intervention.

Strategies in Anxiety (%)	Pilot Pre Int n = 19	Pilot Post Int n = 19	Cycle2 Pre Int n = 14	Cycle2 Post Int n = 14
Self-calm	5	11	36	21
Use book	0	5	7	7
Focus/listen	21	16	0	7
Effort	16	16	0	0
Distraction	5	21	29	7
Seek help	5	16	0	43
Work avoidance	5	16	7	21
Peer avoidance	0	11	0	0
Do nothing	11	11	7	14
N/A (no anxiety)	37	16	7	0
Unsure	0	0	7	0

Help-seeking is another strategy with significant change post-intervention. The percentage of responses referencing help-seeking in cycle two increased from 0% to 43%. Several students who previously listed self-calming as their strategy, changed to using, or stating they would use, peer or teacher help to reduce anxiety.

Cognitive and affective responses to anxiety pre- and post-intervention

<u>Cognitive responses</u>

Students demonstrated a greater tendency to respond cognitively to anxiety after intervention sessions. Responding to 'what do you do to reduce anxiety if you feel it?',

cognitive responses increased from 42% to 63% in the pilot and from 36% to 64% in cycle two (table 7).

Pilot cycle students increase cognitive responses by 21% (table 7) in part due to three students stating they have no anxiety pre-intervention then writing cognitive responses post-intervention. As well as a change in response to anxiety, there was also a change in how the responses are described that highlights the possible interplay of affective and cognitive responses (Hembree, 1990). Student H, pre-intervention, described their response affectively, as 'I don't do anything'. Post-intervention, the response was more descriptive as well as cognitive: 'I don't know. I look about to see if others are struggling. I ask for help'. A similar pattern was seen in cycle two, with students switching from affective to cognitive responses to anxiety, such as student CC who stated, pre-intervention, 'when I feel nervous, I just calm down', to 'ask the teacher for help' (appendix A).

Table 7: A table showing the percentage of students in each intervention group who responded to anxiety affectively, cognitively or had no response.

	Pilot Pre Int (%) n = 19	Pilot Post Int (%) n = 19	Cycle2 Pre Int (%) n = 14	Cycle2 Post Int (%) n = 14
Cognitive	42	63	36	64
Affective	21	21	50	43
No Anxiety	37	16	7	0
Unsure	0	0	7	0

Changes in response to anxiety in the pilot cycle suggest that when students stated 'no anxiety' pre-intervention students may be experiencing anxiety but are unable to or uncomfortable identifying the cause. Three students illustrate this, switching response from no anxiety to cognitive (appendix B). These cognitive responses are not always positive at first glance as with student K who writes 'I don't. I just worry. And start talking'. However, this may indicate increased awareness and a possible positive step in self-reflection (Apostolidis and Tsiatsos, 2021).

Affective responses

The intervention appears to have had little effect on the proportion of affective responses to anxiety. Just as some students changed *to* affective responses post-intervention, other students changed *from* affective responses. Students H and O developed cognitive responses post-intervention, changing, in the case of student O. from 'daydreaming to feel better' to 'I'll talk to the teacher' in the event of feeling anxious.

Post-intervention, three students M, MM and PP gave mixed responses that were affective and cognitive, reinforcing the blur between emotional and cognitive reactions (Henschel and Roike, 2016). This was not observed pre-intervention, where students gave just one strategy each. These three students provided greater detail post-intervention, with multiple strategies to manage anxiety (appendix B). Interestingly, pre-intervention, these three students all initially self-reported affective responses to anxiety before responding post-intervention with multiple strategies, suggesting that emotional responses can develop into more complex emotional and cognitive responses (Hembree, 1990).

No reported response to anxiety

Post-intervention, six of the nine students who previously stated that they had no anxiety, and therefore no response to anxiety, altered their responses to provide reactions that were either affective or cognitive (appendix B). This shows a possible increase in instances of anxiety after the intervention, although there may be other causes, such as familiarity with the questionnaire or increased trust that allows students to be more open about their concerns (Lau et al., 2022).

Self-regulation strategies and responses to anxiety

Students were asked how they regulate themselves and avoid losing concentration. Among students who reported cognitive responses to anxiety, the number of students who reported the use of focusing or listening to self-regulate doubled from five to 10 instances post-intervention, increasing from 38% to 48% due to the large increase of students within

this category (table 8). However, students who reported affective responses to anxiety did not report any increase in this strategy.

Table 8: showing self-regulation strategies employed by students with cognitive or affective responses to anxiety. The number of students in each group is represented by n.

Strategies for SR (%)	Cog Response Pre Int n = 13	Cog response Post Int n = 21	Affect Response Pre Int n= 11	Affect response Post Int n = 11	No Response Pre Int n = 9	No response Post Int n = 3
Teacher support	31	29	9	27	11	0
Seating position	15	5	9	9	0	0
Regulate talking	0	0	0	0	0	0
Focus/listen	38	48	55	55	33	67
Use my book	15	19	9	0	11	33
Peer support	0	5	0	0	0	33
Avoid peers	23	10	18	9	11	0
Do enjoyable tasks	0	5	0	0	0	0
Positive mindset	0	0	0	9	0	0
Fidget	0	0	0	9	0	0
Do nothing	0	0	0	0	33	0
Unable to regulate	0	5	0	0	0	33
Unaware	0	0	0	9	0	0

Pre-intervention, students with no reported response to anxiety provided a range of self-regulation strategies. Interestingly, three pilot cycle students (G, Q, and R) claimed they do nothing to self-regulate in pre-intervention questionnaires. This response is only observed among students who also reported no response to anxiety (appendix B). All students who stated that they had affective or cognitive responses to anxiety were able to also list some strategies that they used to self-regulate, even if these were not all helpful for learning. Those with affective responses to anxiety reported an increase in the use of teacher support (9% to 27%) and, conflicting with reports that peers disrupt concentration, a slight decrease in avoidance of peers pot-intervention. Students with affective responses seemed to recognise that other students may disrupt their thinking but may be able to better employ deficient inhibition mechanisms than those with cognitive responses, and so ignore the distraction subconsciously (Hopko et al., 1998).

Student K stands out as an anomaly (table 8; appendix B): among students with cognitive responses to anxiety, this is the only student expressing an inability to regulate post-intervention. However, it is worth noting that pre-intervention, student K recorded no anxiety and no response to anxiety meaning that although self-regulation appears to have

deteriorated, their ability to express anxiety, their awareness of anxiety, or level of anxiety, has increased.

Effects on self-efficacy in relation to responses to anxiety

Examining how students experience self-efficacy, we asked students how they experience and manage difficult work. Students who responded to anxiety cognitively, affectively, or had no response, all reported anxiety as the most common reaction to difficult work (table 9). This did, however, decrease among all groups after the intervention, which may indicate that students have identified tools they can use to respond to difficult questions, thereby decreasing anxiety (Zimmerman, 2013).

Looking at students with cognitive responses to anxiety, these showed a substantial increase in 'general positivity' towards difficult work post-intervention, increasing from 15% to 43% (table 9), where intervention work focused on mastery and positive interactions. This increase in positivity stems from a variety of pre-intervention responses such as previous avoidance (student K), or those who felt nervous such as student C, who demonstrated improved self-belief by more optimistically explaining 'I know I can start most questions so I don't worry too much. I know I will understand once I have the solution explained or I'm given a hint'.

Table 9: showing the effect of difficult work on students with cognitive or affective responses to anxiety

Effect of Difficult Questions (%)	Cognitive Pre-Intervention n = 13	Cognitive Post-Intervention n = 21	Affective Pre-Intervention n = 11	Affective Post-Intervention n = 11	No Anxiety Pre-Intervention n = 9	No Anxiety Post-Intervention n = 3
Anxiety	54	33	45	36	11	0
Lose Focus	0	0	0	0	11	0
General negative	8	0	18	9	11	33
Avoid	8	10	0	27	0	0
Peer worry	0	5	9	9	11	0
General positive	15	43	18	36	33	67
Effort	8	14	9	27	0	0
Unaware	15	5	0	18	11	0

Students who reported affective responses to anxiety recorded a post-intervention increase in avoidance of difficult work (0% to 27%). These results appear discouraging although may

be less concerning than first thought. Student EE first wrote 'bad' when describing feelings about difficult questions, but post-intervention wrote 'I usually skip them'. Likewise, HH first expressed 'nerves' but then developed their response to 'Ok, I might not do it'. While avoidance of work is not the reaction to difficult questions we want to encourage, considering students' starting points these results may indicate positive progress.

Self-efficacy strategies and responses to anxiety

Analysing students according to their responses to anxiety, there are differences in how cognitive and affective responders tended to exhibit self-efficacy in the face of difficult questions. Post-intervention, students who responded cognitively to anxiety increased their self-efficacy through applying effort, from 15% to 52%. Students with affective responses to anxiety showed less increase in effort in the face of difficult questions but this still increased from 18% to 27%, suggesting a developing growth mindset (Dweck, 1985) with greater belief in effort post-intervention, or knowledge that effort could be useful (table 10).

Table 10: showing self-efficacy strategies when given difficult work, comparing students with cognitive or affective responses to anxiety cross both cycles of intervention

Self-efficacy strategies(%)	Cog Responders Pre-Int n = 13	Cog Responders Post-Int n = 21	Affect Responders Pre-Int n = 11	AffectResponders Post-Int n = 11	No Anxiety Response Pre-Int n = 9	No Anxiety Response Post-Int n = 3
Use book	38	43	64	45	11	0
Effort	15	52	18	27	44	33
Teacher Support	23	29	18	9	22	33
Peer Support	23	29	9	27	11	33
General Help	23	19	9	18	22	0
Nothing	8	5	0	0	11	67
Avoid	8	0	0	0	11	0
Distract self	0	5	0	9	0	0
Unsure	0	0	0	9	0	0

Among affective responders to anxiety, the increase from 9% to 27% in reported use of 'peer support' was notable, as students seemed to be more comfortable seeking help from classmates. Data suggest students also grew to be comfortable seeking general help from teachers. A decrease was noted, however, in the use of books, with a marked decrease from 64% to 45% post-intervention within this same group. These data, when looked at more

closely is not as stark as first appears, as within affective responders there is a decrease in total students, meaning each entry carries more weight. Therefore, the decrease from 64% to 45% represents only a decrease of two students in real terms (appendix J).

4.4 Student Illustrations

Apart from the above analysis of the findings of the intervention group, it was also possible to discern some overarching changes in individual students. For example, the findings suggest students benefitted from the interventions to varying degrees. The intention of this research was to help students understand any learning-related anxiety they felt and equip them with strategies to reduce the impact of anxiety on learning. The two students discussed below reported varied responses across the course of the intervention.

Student H, a student who struggled to stay in mathematics lessons and who would frequently truant, is an example of positive development during the intervention time. Their responses changed from seeming disengaged and affective, stating 'I don't do anything [when they feel anxious]' to 'I don't know. I look about to see if others are struggling. I ask for help'. Strategies for self-regulation (concentration) and self-efficacy (managing difficult questions) also developed to become more detailed post-intervention, for example when they feel they are losing concentration: 'I try to engage in the lesson more: ask questions, answer questions, write examples.'.

The most marked change was H's approach to difficult questions, showing more self-efficacy by changing from 'I don't do anything' to 'I'll try and solve the problem but if it gets too hard I wait for help'. This student also developed awareness or willingness to communicate what helps them, seen in post-intervention responses such as 'I need an example. I'll wait until the teacher explains'. This awareness of needs and how to manage challenge was mirrored in the group interview where student H, in reference to the benefits of online work, said 'Online only helps to a certain extent, if you kind of know what to do. But you can get stuck and a teacher is the best to help' (appendix C).

Student K self-reported very different changes during the intervention, first reporting no anxiety and 'I don't need to' in response to managing anxiety. Post-intervention, anxiety is self-reported due to 'Homework makes me anxious. I don't have anyone to help me at home. In lesson I feel anxious in a test', and they refer to worry when they feel anxious with no strategies to manage this. Self-regulation also seemed to deteriorate, with concentration changing from 'I make sure I listen' to 'I don't think I concentrate well'. Self-efficacy responses to difficult questions raised incongruencies with an increase in finding questions difficult but improvements in strategies to manage them, with reports shifting from 'I just leave them' to 'I do some working out on my own. I'll ask the teacher to check'.

In the group interview, student K was open about the experience of negative self-talk in the face of difficult questions, saying 'I just tell myself I'm so dumb, I'm not going to get it right. I don't even know the answer'. They also identified homework as a source of anxiety, particularly the consequences of not doing well and having parents involved. Verbal responses to apparent anxiety-inducing situations such as difficult work or hard homework were highly affective, with exaggerated responses such as jumping out of windows or hating teachers. Later, during one-one, Student K stated that these were not literal responses, but these do highlight a poor management of emotions, supported by frequent reference to distractions and avoidance such as pen snapping or purposefully arriving late to lessons.

These very different student responses over the period of the intervention highlight how anxiety is caused by multiple factors (Dowker et al., 2016), and the importance of teachers knowing their individual students when identifying anxieties or planning interventions and support (Layne et al., 2006). Student H somewhat flourished in the small group setting, developing responses, openness, and showing high levels of self-efficacy and regulation, and aligning with evidence from previous small group studies (Margolis, 2005; Feldman, Kim and Elliott, 2011; Wang and Lu, 2020). Student K, on the other hand, maintained some negative attitudes and self-talk but was open about this, demonstrating some self-awareness without necessarily being able to evaluate or modify their behaviours (Zimmerman, 1990).

5.0 Discussion of findings

Descriptions of anxiety

Given how anxiety is rooted in a complex interplay of social, environmental, and genetic factors (Muris, 2007), it is unsurprising that students cited a variety of causes of anxiety. As suggested by Lei et al., (2021), that peer competition can create anxiety through fear and a focus on results; students in this study cited their peers as the most common cause of their anxiety. Intimating a risk to pride if answers were incorrect, some students who reported peer-related anxiety also worried about failure or 'looking stupid', suggesting general anxiety about looking dumb in front of other students (Micari and Pazos, 2014; Cano et al., 2017).

Although the intervention was framed around mathematics, the causes of anxiety fell predominantly within the category of general anxiety, relating to social causes such as peers or failure in general. Mathematics anxiety, the fear or apprehension of mathematics, is cited within responses but only within the second cycle where the questionnaire directly asks about anxiety in mathematics, highlighting how the questions in cycle two may have been unintentionally leading (Cohen et al., 2018 pp. 492); and findings related to the causes of anxiety may not therefore accurately reflect participants' views. Encountering peers, dealing with the concept of failure, or facing hard questions, are everyday situations where anxiety related to these would be considered general anxiety. While general anxiety can provide fertile ground for other types of anxiety (Dowker, et al., 2016), our findings do not demonstrate a clear connection with any other anxieties.

Contrary to reductions in anxiety via interventions where teachers disrupt negative thoughts (Venkakoski, 2020), students in this research expressed increased anxiety after their small group interventions, with fewer students declaring they experience no anxiety. While this outcome appears troubling, it is possible that students felt more able to admit to anxiety after developing positive relationships with the teacher and peers and as suggested by Dreyfus (2002), and were therefore more willing to actively engage with the questionnaire due to a sense of belonging and security (King-Sears and Strogilos, 2020). Additionally, the

intervention focus on discussion and disrupting negative thoughts may have improved students' ability to articulate their concerns (Micari and Pazos, 2014; Apostolidis and Tsiatsos, 2021), helping students introspect and identify the causes of thoughts of feelings. Therefore, student anxiety may not have increased across the course of the intervention, although further investigation would be required to ascertain this.

Findings appear to reflect the concern that interventions where students experience perceived failure can have a negative effect on confidence and increase anxiety (Schunk, 1989). Although the intervention was careful to focus on effort and processes, students reported an increase in anxiety caused by peers. Activities regularly required paired work to share and compare solutions, which may have inadvertently caused excessive comparison and the perception of failure. Findings further support this negative consequence as students also reported increased anxiety related to failure, reiterating how the small group work may have affected students' pride (Atkinson, 1974), and increased anxieties about making mistakes (Micari and Pazos, 2014; Cano et al., 2017).

Strategies to manage anxiety

Distraction, typically considered a maladaptive behaviour, is used by students as a method to manage anxiety, possibly to deflect from concerns that they might fail (Atkinson, 1974). As observed in this research, students employ distractions such as chatting or humming as a strategy to manage their anxiety about the work. However, this method may further impede students' ability to access the work by overloading or distracting the working memory and leave no room for learning (Cocks et al., 2016).

As possibly evidenced through increased work avoidance and distraction in the pilot cycle, a negative feedback loop of anxiety, distraction, and inaccurate work can lead to further anxiety when students' concerns that they cannot complete the task are confirmed by distracted working that hinders learning (Ansari et al., 2008; Wieser et al., 2009; Sluis et al., 2017). Recalling earlier concerns that peer work increased competition and intensified

perceived failure, the intervention may have increased the use of these maladaptive coping mechanisms for pilot participants.

Interestingly, the pilot cycle responses contrast somewhat with cycle two students' methods for managing anxiety with those in cycle two seeking distraction less after their intervention sessions. Coinciding with a large increase in students seeking help (from teachers or peers) when anxious about work, this demonstrates how small group intervention can help students find methods to engage with their learning while reducing anxiety (Dreyfus, 2002; Hirvonen, 2013). Furthermore, observed by an increase in the use of peer help, the intervention appears to have developed students' appreciation of different perspectives and multiple methods, resulting in more collaborative approaches when anxious (Myers and Lamm, 1997; Martin and Marsh, 2003).

However, highlighting how these mindsets require trust and belonging (King-Sears and Strogilos, 2020), and how the make-up of the group is fundamental to the success of interventions, student HH volunteered their response to peer collaboration in interview:

Student HH *"if I don't know them or I'm not comfortable with them I won't talk in front of them".*

In this instance, the intervention group may not have been a positive experience for student HH as they appeared to disengage from peers, citing reasons for distraction after the intervention as 'Other people, noises. If I don't understand'. Alternatively, drawing on the deficient inhibition mechanism (Hopko et al., 1998) and findings of Morosanova and Fomina (2017), it is possible that student HH became more aware of their distractions and began to develop responses alongside their increasing awareness of anxiety.

Cognitive Responses to Anxiety

Supporting the theory that cognitive responses to anxiety such as worry can become overwhelming (Ashcraft et al., 1992; Putwain et al., 2015), students in this research found

worry led to distraction tactics such as talking, with students unsure how to manage their anxiety. However, when students can regulate their responses through attention management and concentration, anxiety and worry are managed positively (Cocks et al., 2016), as seen among the students in this research. Student D exemplifies this by writing 'I listen hard. I know that if I make the most of school time I feel calmer'.

That students can counter their worry is encouraging, as studies show how low self-regulation correlates with anxiety (Shores and Shannon, 2007) but by interrupting worry with proactive regulation this relationship can be disrupted (Aspinwall and Taylor, 1997). To counter negative cognitive effects of anxiety, students need to be aware of their anxieties and have efficacy for self-regulation (Zimmerman and Martinez-Pons, 1992), which helps us understand some anomalies in the data where some students expressed no anxiety and yet later listed strategies to manage anxiety. All these students wrote affective responses, highlighting that all students with cognitive responses were able to identify their anxieties and possibly implying awareness of anxiety is stronger, or more at the fore in students with cognitive responses. This perspective aligns with theory that some students have more observable behavioural reactions due to cognitive responses, while other students react in affective ways that are harder to detect – physiologically or emotionally (Ahmed et al., 2012; Minahan and Rappaport, 2012; Lei et al., 2021).

Post-intervention, students with cognitive responses to anxiety demonstrated efficacy for self-regulation coined by Zimmerman and Martinez-Pons (1992), observed via increases to positive self-regulation such as focusing or listening, along with smaller increases in the use of books or teacher help. Zimmerman (1990) might explain the anomaly, student K, in this group as not having completed the self-oriented feedback loop that encourages self-knowledge and regulation. Pre-intervention, this student reported no anxiety and listed their self-regulation strategy as listening; however, they had no strategies to manage anxiety. Their post-intervention recognition of anxiety and cognitive responses is potentially the first step to developing self-regulation strategies through self-observation. According to the self-oriented feedback loop, this student also needs to develop self-judgement, self-reaction, and self-evaluation to understand strategies that work for them (Zimmerman, 1990) and manage distractions (Aspinwall and Taylor, 1997).

Questionnaire data suggest students' self-regulation improved but also that instances of anxiety increased, drawing into question how self-regulation and anxiety interact. These data are at odds with processing efficiency theory and attentional control theory (Eysenck and Calvo, 1992; Eysenck, 2007) that explain self-regulation as a mediator for anxiety, meaning improved self-regulation should reduce anxiety. Also contradicting questionnaire data, student interviews somewhat support the theory that high levels of self-regulation reduce anxiety (Eysenck, 2007), identified by student II, who exhibits low anxiety and a proactive response to losing concentration:

Teacher	*What do you do when you realise you've not been paying attention?*
Student II	*Just starting listening, and try to catch up*
Teacher	*Ok, so maybe hope you can fill in the gaps?*
Student II	*Yeah, I do. I just hope.*

Although the increased reporting of anxiety coincides with increased regulation, it is worth remembering that these are student self-reports, so while students may have a more developed understanding of how to address lapses in concentration, without observational data we cannot determine if these strategies are enacted. As questionnaires are completed in front of class teachers, it is possible that students feel under pressure to respond a certain way (Cohen et al., 2018 p. 502), or that they want to please their teachers (Pedder and McIntyre, 2006). Alternatively, as mentioned above, students may not have fully explored their self-oriented feedback loop, so have yet to employ and benefit from the improved knowledge of self-regulation strategies (Zimmerman, 1990).

Where students with cognitive responses to anxiety do appear to have benefitted from improved self-regulation is in their response to difficult questions. Although we cannot say if the large increase in general positivity towards difficult questions is due to self-regulatory aspects of goal setting or understanding the task value (Fredrickson, 2003), students have demonstrated increased optimism and positive psychological mindsets (Britner and Pajares, 2006), which helps explain the parallel decrease in anxiety about difficult questions.

Through the lens of growth mindset (Dweck, 1985), the intervention's focus on mastery and emphasis on process over outcome, may have helped students self-regulate and manage their anxious responses as students realised the benefits of effort. Martin and Marsh (2003) believe that a more optimistic approach, gained through a mastery focus, helps this growth in effort, which is again seen in this research where the use of effort in response to difficult questions increased significantly after the intervention compared to little change across any other strategy.

Achievement theory agrees that a focus on mastery helps reduce competition among peers, which may encourage students to take greater risks with attempting challenging work because their pride is less threatened (Atkinson, 1974; Covington, 1982). However, there would also be an expected decrease in avoidance of work as students no longer require maladaptive methods to protect their self-worth. Contrary to this expectation, avoidance among students increased post-intervention, as seen with student VV stating they would 'get stuck, skip the question and not do the rest'. However, the two students with post-intervention cognitive response to anxiety, who also declared avoidance of difficult questions, stated that peers contributed to the anxiety. It is therefore possible that these students did not benefit from the mastery element of the sessions if they were anxious about working with peers, or if working in small groups perpetuated competition with peers and concerns about making mistakes (Schunk, 1989; Cano et al., 2017).

Affective Responses to Anxiety

Turning to students with affective responses to anxiety, the intervention initially appears to have had little effect. Taking affective responses as those based on emotionality (Dowker et al., 2016, Henschel and Roike, 2016), there is a slight decrease in the number of students responding to anxiety this way after intervention. Unlike cognitive responses that can be helpful, with a focus on extra learning or self-talk, affective responses here were consistently negative with references to overwhelming emotions and nervousness. Due to interventions being initially based around mathematics, the lack of enjoyment corresponds with thinking that most affective responses to mathematics anxiety are negative (Henschel

and Roike, 2016), eliciting nervousness over interest or excitement. Although the intervention focused on processes and mastery, the predicted increase in optimism among students has not, as yet, manifested as reported interest (Martin and Marsh, 2003).

Bandura (1993) posits that affective responses are closely tied to self-efficacy, which is not wholly borne out in this research where, among students with affective responses to anxiety, there is less change to some self-efficacy strategies compared to those with cognitive responses to anxiety. However, this may be partly due to the decrease in affective responses overall, meaning each student represents a larger percentage in each strategy and increases or decreases can change more dramatically.

The intervention appears to have had little effect on how students with affective responses to anxiety employ strategies to self-regulate their learning, although this is unsurprising given the closer connection between cognitive responses, such as worry, and self-regulation (Eysenck and Calvo, 1992). Confidence in the teacher is an important factor in reducing anxiety (Lau et al., 2022), with positive interactions shown to support this growth in confidence (MacPherson, 2016). This supports the finding that, among students with affective responses to anxiety, the greatest change after the intervention is seen in teacher support. Students reported asking the teacher for more help when they lose focus, indicating growing trust or comfort in the group and with the teacher.

Positive teacher interactions aimed at improving communication within the group also benefit class dynamics by fostering a sense of belonging among students (King-Sears and Strogilos, 2020). So, although small group work comes with a risk of increasing peer comparison and insecurity (Schunk, 1989), in our data we see a small decrease in peer avoidance when students are trying to self-regulate. Interestingly, this coincides and appears to conflict with a reported increase in students stating that peers are the cause of loss in concentration. Students may attribute their self-regulation to focusing or listening, as per our results, and they may also have developed improved deficient inhibition mechanism (Hopko et al., 1998), allowing them to ignore ‘task-irrelevant’ stimuli more ably.

Looking at how self-efficacy interacts with affective responses to anxiety, students were asked about their reaction to difficult questions as well as strategies to manage these questions. Research shows students with low self-efficacy often avoid difficult activities due to low self-belief (Wigfield and Eccles, 2000; Bandura et al., 2001), which suggests the intervention reduced self-efficacy as evidenced by an increase in avoidance of difficult questions among students with affective responses to anxiety. Findings are, however, inconsistent as students in this group also report an increase in effort, which indicates high self-efficacy (Zimmerman, 2013).

Although an increase in avoidance and an increase in effort appear misaligned as reactions to difficult questions, when the responses themselves are examined, avoidance is accompanied by some effort and students are not in fact refusing to try difficult questions.

Student F *I sometimes don't try them. If I don't have help I won't try.*
Student G *I try them but if I don't understand I won't*
Student EE *I usually skip them*
Student HH *Ok. I might not do it*

Requiring help with challenging problems, and the ability of students to understand when they need help, is an important aspect of self-efficacy (Zimmerman, 2013). That students are not wholeheartedly committed to persevere is possibly due to the relatively short period of intervention, across five weeks. Due to the different ways students have come to be affected by anxiety, and how they experience anxiety (Dowker et al., 2016), it cannot be expected that students respond uniformly to the same interventions, with some taking longer to build trusting relationships and security in a new group (King-Sears and Strogilos, 2020).

The increase in students 'generally positive' reactions to difficult questions echoes findings that small group work boosts confidence (EEF, 2014) and, although studies suggest a focus on processes and mastery can create this reaction (Stankov et al., 2012; Hirvonen, 2013), the effects may be just the result of being in a small group. In conversation, students expressed that they preferred small groups, illustrated by student HH below:

Student HH	*It's harder to talk in a bigger class*
Teacher	*OK ,why do you feel that?*
Student HH	*More people*
Teacher	*Ok, what makes it worse when there are more people?*
Student HH	*People judge, they look at you.*

This conversation highlights the perception that there is less chance of being judged in a smaller group, possibly contradicting the theory that small group work increases anxiety (Schunk, 1989). It is not possible to tie this student's comment to fear of failure or worries about peer comparison as the comment could relate to non-academic concerns about judgement. However, reduced anxiety, for whatever initial reason, is broadly positive with possible benefits of increased working memory, processing, self-belief, and perseverance (Pekrun et al., 2002; Fredrickson, 2003). Therefore, working to ensure students are in an environment with minimal anxiety is beneficial even if this first reduces social anxiety before impacting academic anxiety.

Understanding that cognitive and affective responses, self-regulation, and self-efficacy interact and influence one another (Pekrun, 2002; Carey et al., 2016), improved self-regulation may also enable students to manage challenging situations more effectively with greater self-efficacy (Aspinwall and Taylor, 1997). In this research, students self-reported a shift in how to manage difficult work, from significant reliance on books to a more even spread of strategies, indicating improved awareness and self-knowledge (Zimmerman, 1990).

Students increased their reported use of effort in the face of difficulty which, along with a minimal decrease in anxiety, might be explained as students over-striving to avoid failure (Ho et al., 2000; Martin and Marsh, 2003). Responses to difficult questions somewhat support this theory as students in this affective response group show an increase in wanting to avoid difficult questions after the intervention, combining both effort and avoidance in responses. Although an increase in effort in the face of difficult questions may be perceived as higher self-efficacy due to well managed anxiety (Lei et al., 2021) these students do

appear to have been affected by small group work, increasing peer comparison and extrinsic motivation to avoid failure (Eysenck and Calvo, 1992: Cano et al., 2017).

No Anxiety

Discussing how the intervention affected students who reported no anxiety is problematic due to the large change in student numbers, making comparing trends in responses difficult. However, this decrease from nine to three students is interesting and appears to represent an increase in anxiety. As discussed previously, this may not truly be the result of increased anxiety but be due to increased awareness or trust in the classroom setting (Dreyfus, 2002; King-Sears and Strogilos, 2020).

The self-oriented feedback loop, purporting the importance of self-observation as a crucial element of self-regulation (Zimmerman, 1990), goes some way to explain why the only students to state they had no self-regulation strategies (G, Q and R) also believed they had no anxiety. These students may not have the emotional self-knowledge, or efficacy, to be able to recognise their anxieties, which in turn causes deficient self-regulation, seen in how students report no strategies to manage concentration (Apostolidis and Tsiatsos, 2021). Although the intervention appears to have had little effect on how these students reported anxiety, or recognised anxiety, with two out of three maintaining 'no anxiety', all three students were able to provide self-regulation strategies after the intervention. Alternatively, the reporting of 'no anxiety' may really indicate these students experience no anxiety related to learning, or that students have not yet developed the trust in the teacher and group work whereby they can confidently disclose how they feel (Lau et al., 2022).

Limitations

There are several limitations to this research that must be considered, from the development of instruments to the implementing of the interventions. At the outset the intention was to involve multiple subjects and collaborate more broadly across the school. However, due to staff absences as a result of the pandemic, interventions outside mathematics were paused meaning collaboration was restricted to one subject.

The intervention itself was designed for small groups, which is an unusual experience for students in my school. The intervention activities were created to encourage discourse in the classroom, focusing on identifying difficulties within problems, sharing ideas, and maintaining positively framed comments throughout. It is unclear from the data gathered whether any changes to anxiety responses, self-regulation, or self-efficacy are a result of the small group setting, the intervention activities, or a combination.

The use of a pilot cycle provided opportunity for my colleague and me to reflect on student responses and amend questionnaires or activities. However, by changing the order of questions and adding a question related to mathematics anxiety specifically, students may have been more inclined to explain anxiety as related to a topic. This question may have been unintentionally leading, possibly resulting in a greater number of students identifying anxieties related to mathematics out of a sense of wanting to please the teacher. Equally, opening the questionnaires with questions about anxiety may have influenced students to respond that they experience anxiety. This may also have filtered through the questionnaire, potentially artificially increasing the number of times anxiety is mentioned as a response to lack of concentration or difficult questions.

The instruments used were designed for this research and, although based on well-used questionnaires, the set of questions used here has not been used before, limiting the validity of these findings. Observations were intended to be used to complement the questionnaires and were planned to allow my colleague or a member of the leadership team to write observations about student behaviours and responses. Once again, due to

staff shortages, we were unable to accommodate this as non-contact time was often used to support other classes.

These findings are only relevant to the students within the study. We know from the literature that the causes and effects of anxiety vary greatly between individuals due to the range of factors that feed into the development of anxiety. The findings highlighted stark differences between cycles, despite consistency of teachers, the same intervention material, and these students being from the same school. Due to several inconsistencies between both cycles of the intervention, we cannot make any generalisations about how this intervention would work or how students respond to anxiety in other classes, other subjects, or other schools.

6.0 Conclusions

This research began with the aim of understanding how students respond to anxiety and how to promote better management of anxiety. In my school, teachers had previously noted an increase in dysregulated behaviour such as avoiding work or disrupting lessons while students were expressing increased worry and anxiety about school. Through analysis of the literature and intervention data I have been able to glean some insights into how students express and experience anxiety, although any findings are limited to students within these intervention groups, as explained in the limitations.

1. How do students describe their anxiety?

This research identified anxiety about peer perception and peer judgement as a common issue. Also highlighted was a connection between students' anxiety about peer judgement and anxiety about failure, which suggests students are struggling to manage their feelings of pride and are prone to peer comparison. Literature indicates that peer comparison, where a student compares negatively to others, impacts self-worth and dents pride meaning failure can become preoccupying.

In this research, despite the intervention taking place in the context of mathematics, the anxiety students describe is mostly general, with accounts of social anxiety due to peers, general concern about failing, or no anxiety. I therefore conclude that mathematics anxiety is not as pervasive as general anxiety, particularly as students only identified mathematics concerns when specifically asked about the subject, leading to questions of validity.

2. How do students describe the responses they have to anxiety?

Students described typically maladaptive responses of distraction and work avoidance, which literature often ties to concerns about failure, low self-worth, and peer comparison and tallies with students' descriptions of anxiety. However, students were also able to identify adaptive methods to manage anxiety, referencing self-calm, the importance of focusing on work, and making use of external help.

Cognitive responses to anxiety were more readily identified by students in this research, with worry, positive self-talk or help-seeking among those reactions listed. The alternative, affective emotional responses, were less readily identified by students suggesting students are more comfortable expressing, more aware of, or genuinely experience more thoughts compared to emotions. The increase in reports of affective responses after the intervention suggests that identifying emotions may require trust, meaning more students may experience emotional responses to anxiety than this research indicates.

3. In what ways has the intervention helped influence student management of, and responses to, anxiety?

The intervention appears to have influenced student management of, and responses to, anxiety in a few ways. Very few students maintained that they experience no anxiety after the intervention and although this may indicate increased levels of anxiety, group interviews suggest students felt more comfortable in the intervention compared to normal lessons. This research therefore argues that the intervention provided students with the safe space or the vocabulary to better describe their anxieties. The increase in students reporting help-seeking when anxious furthers this argument. Whether this is help from the teacher or peers, a greater number of students identified how interactions with other people can allay anxiety. The relentlessly positive interactions between teacher and student, accompanied by frequent collaborative work that intentionally focused on mastery, process and normalising failure, appear to have positively impacted students' attitudes towards others.

Finally, the data highlight encouraging effects of the intervention on self-efficacy, increasing students' positive reactions to difficult questions. Optimism was often combined with acknowledgement of the impact of effort, suggesting improved self-belief and confidence. While this research acknowledges that instances of anxiety with difficult questions remains high, we propose that this may be in part due to greater awareness of emotions and thoughts, particularly as strategies to manage difficult questions are overwhelmingly positive. The intervention improved not just students' recognition that effort is an option for

managing difficult questions, but also increases how often students say they use effort showing increased awareness that transfers into reported action.

Overall, this intervention has been an enlightening insight into how students react to and experience anxiety. Although results vary between cycle and individual, the use of small groups was well received by all students and this researcher found all students, regardless of historical avoidance of learning, to be engaged, attentive, and cooperative with others. I propose that the use of small groups in other areas of the school is worth exploring and that the benefits of positive student-teacher interactions, and a focus on processes not outcomes, deserves further discussion within other subjects and classes.

Further Research

This research would benefit from being extended into other subjects within the school, to determine whether the benefits translate outside of mathematics. The senior leadership team in my school has identified several subjects where similar interventions would be beneficial, meaning further collaboration across the school.

Further research should also plan for observations of students, to determine if self-reports can be evidenced in classroom behaviours, expressions, and actions. Ideally, this would be undertaken by an additional member of staff to allow the teacher/researcher to focus on the class. This will help understand if students are actively carrying out changes to their thinking and new strategies, or whether students are building increased awareness of how to manage anxiety.

Another line of research would be to leave out explicitly anxiety-related questions, instead focusing on common situations that may cause anxiety such as difficult questions. This would have the benefit of reducing how likely students are to respond with anxiety-related answers, just because previous questions have placed this thought in their minds.

Informally in discussions out of class with their teachers, students were overwhelmingly positive about their experience in small groups and working with each other. Feedback from students that they want to continue, and for individuals to proactively ask if they can be

considered for subsequent intervention sessions, is wonderful, and shows there is an opportunity to do some really important work with these students who have previously found school a tough place to be.

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8.0 Appendices

Appendix A: Student Questionnaires

Pilot Questionnaire

1. Anxiety/**What activities in a lesson make you feel anxious? Why?** (Carey et al., 2017)
2. Anxiety/**How do you try to reduce any anxiety in lessons?** (Carey, Hill et al., 2017)
3. Self-regulation/**Are you aware of when you lose concentration?** (Cano et al. , 2017)
4. Self-regulation/**What do you do to maintain concentration?** (Cano et al., 2017)
5. Self-regulation/**What causes you to feel less focussed on your learning?** (Cano et al., 2017).
6. Self-Efficacy/**How do you feel about difficult questions in class?** (Cuoco, Goldenberg and Mark, 1996).
7. Self-Efficacy/ **When you come up against a difficult question but still think you can solve it what do you do?** (Cuoco, Goldenberg and Mark, 1996).

Cycle Two Questionnaire

1. What activities in a Maths lesson make you feel anxious? Why?
2. Do any activities in other subjects make you anxious, and why? (group work, sharing answers, whole class work)
3. What do you do to reduce anxiety if you feel it? (breathing, asking a friend for help…)
4. What do you do to concentrate in lessons? (things you might avoid or might do)
5. Are you aware of when you lose concentration?
6. What distracts you?
7. How do you feel about difficult questions in class? (Thoughts, emotions, physical reactions)
8. When you come up against a difficult question and feel ready to try it, what do you do? (e.g. use your book, tell yourself positive things, talk to your partner, whatever it is you do).

Appendix B: Student Questionnaire Responses

Pilot Responses

Green: cognitive anxiety response/ Yellow: affective anxiety response/ White: no anxiety response/ Pink: cognitive and affective anxiety response

		Pilot Cycle Pre-Intervention						
STUDENT ID	1. What activities in lessons make you feel anxious? Why?	2. What do you do to reduce anxiety if you feel it?	3. Are you aware of when you lose concentration?	4. What do you do to maintain concentration?	5. What might cause you to lose concentration?	6. How do you feel about difficult questions in class?	7. When you come up against a difficult question and feel ready to try it, what do you do?
A	I don't feel anxious	I don't need to because I don't feel anxious	Yes. I like calm spaces and manage to stay calm even when the classroom is noisy. I know that noise will distract me	I try to keep calm. I listen to the teacher	If people talk - or if I	I think I feel stressed.	I speak to a teacher or ask a friend who sits behind me.
B	Nothing makes me anxious	I don't need to. I don't tend to feel anxious about school or work.	Not always. I stare a the work and focus on what the task is. I try not to look around. Sometimes I don't realise I have stopped listening	I try to listen. I try not to talk to people about other topics.	People talking distracts me	When something is hard to do it makes time slow down and I start daydreaming. I think about how long the day seems.	I don't do anything. I wait for help.
C	If I am asked a question in class when I don't understand something. I feel anxious because everyone is watching and I don't want to get the answer wrong or look stupid.	I try to anticipate when a teacher will ask a question. I like to be told before of given a hint that I'll be asked.	Yes. I don't talk to the people sitting near me. I make sure I listen and stay focused all the time	I sit near people who work well. If people are distracting I ignore them	Nothing - I focus well	I feel nervous to ask for help, especially if we've already gone over examples and other people understand the questions.	I try my best to do it, even if I get the answer wrong.
D	When I am asked a question in front of the class	I try to listen to all the instructions to give myself the best chance of answering well.	Yes. I listen. I don't talk to people. I keep looking through my work.	I make an effort to listen hard. I ask for help and that sometimes helps me concentrate	If the room is noisy I find that hard. If a question is hard I might just stop working.	I find them a bit stressful. I worry and sometimes I will struggle to ask for help	I try to ask for help. But sometimes I stop working and just stare at the page.
E	Being asked a question in front of the class	I will quietly ask for help. I'll listen to other people's answers and explanations. I try to remember that we all get things wrong sometimes	Yes - I will find myself on the same question for a while	Try to ask the teacher to check my work. That helps me focus and work on the next question	A noisy classroom	They are ok - I try my best to work them out and like to do it on my own.	I work on my own, look back in my book, and see if I still need help after trying those things.

		Pilot Cycle Post-Intervention						
STUDENT ID	1. What activities in lesson make you feel anxious? Why?	2. What do you do to reduce anxiety if you feel it?	3. Are you aware of when you lose concentration?	4. What do you do to maintain concentration?	5. What might cause you to lose concentration?	6. How do you feel about difficult questions in class?	7. When you come up against a difficult question and feel ready to try it, what do you do?
A	I don't feel anxious. If I can't do something I don't mind	I find I feel quite relaxed most of the time. If I do feel stressed I try to do something fun and relax	Yes. I am. I concentrate well most of the time though.	I keep calm and then I don't get distracted.	If I feel stressed then I can't concentrate	A little stressed. I worry I should be able to work things out on my own.	I sit and try to work the problem out on my own. I ask my partner for help too. See how they got their answer. Then I'll ask the teacher sometimes.
B	I don't get anxious	I don't. I feel ok about school.	Sometimes. I still find myself not listening.	I concentrate better in small groups. If I write notes I concentrate more.	Talking. Other people distracting me. Too much noise.	I don't find many questions hard. But sometimes I don't know how to start. I don't mind.	I sometimes ask the teacher. Or I'll ask a friend. I wait for answers.
C	Group discussions can make me anxious. Getting questions wrong in front of a lot of people can be embarassing.	I make sure I listen, that I work hard, and feel as prepared as possible	Yes, but a don't often lose concentration. Or if I do I can get it back again	I know what makes me lose focus and I avoid that, like noisy people or people who don't like to work.	Noise and if I worry too much the stress can make me lose focus.	I know I can start most questions so I don't worry too much. If they are also I know I will understand once I have the solution explained or I'm given a hint.	I don't mind talking to my neighbour and comparing answers, if they are also working hard.
D	Answering in front of some people. In a big class you don't know who will judge you.	I listen hard. I know that if I make the most of school time I feel calmer	yes, I am. I know when I might lose concentration and I make sure I focus on my notes or the teacher.	I make sure I focus on my notes or the teacher. I try to keep my area calm and keep lessons for learning.	I know I am easily distracted by friends chatting or a noisy room. I try to keep my area calm and keep lessons for learning.	I worry I am not clever enough to answer them but that I am expected to answer them	I'll use my examples to help and try to work slowly and carefully.
E	A question in front of people I don't know.	I try to stay calm and breathe. I know that everyone makes mistakes but it's harder when I it's in front of people.	Yes.	I concentrate well. Except if things are difficult. I keep trying to work out an answer to hard problems but sometimes just stare at my work.	Difficult questions. I don't like asking for help unless I know the teacher and the people next to me.	Sometimes ok. Depends who I am with. I might feel embarrassed if other people find it easy.	If it's a small class or I know the teacher won't talk about my mistakes loudly, I can ask.

	Pilot Cycle Pre-Intervention							Pilot Cycle Post-Intervention						
G	None	I don't get any	I don't concentrate	I don't really	A boring lessons makes me lose concentration	Nothing	I just do it.	I feel self-conscious when in a class.	I like to keep my coat on and keep to myself. I only work with my friends.	Yes. Sometimes when things are hard I struggle	I don't. I listen if I like the teacher.	When lessons are hard or boring or I don't like the teacher.	I sometimes don't try them. If I don't have help I won't try.	If I am encouraged to work I will. I don't like asking for help but will watch a friend work through the question.
H	Mini tests because I forget everything	I don't do anything	I don't know	Try hard to listen and write examples	If I am tired I struggle to concentrate	I don't think I feel anything	I don't do anything	When I have to speak in front of the class. Having to explain an answer but not knowing if I've gotten the answer correct or not. If everyone in the class understands something and I don't.	I don't know. I look about to see if others are struggling. I ask for help.	Yes, sometimes.	I try to engage in the lesson more: ask questions, answer questions, write examples.	When I am tired I lose focus or if I am bored. Also when I have friends near me.	If it is too difficult I don't bother with the question. I. need an example. I'll wait until the teacher explains.	I'll try and solve the problem but if it gets too hard I wait for help.
I	Speaking in class, in in front of other people	Focus on what the teacher says	yes - I think so.	I'm not sure - I seem to focus most of the time	Not knowing what to do will make me feel distracted	Stressed	I don't attempt the question	Group discussions or having to speak in front of the class as I get nervous and become unsure what I am saying.	I don't take part. I avoid the situation.	Sometimes.	Try to listen to what the teacher is saying and work out what work I need to be doing	When I get bored or find the work too difficult	Worried if I get questions wrong. I feel unconfident.	Go through examples slowly, refer to books for examples. Work through problems at my own pace.
J	Learning something new	Learn it at home - be prepared for the lesson	Yes. If I get to do lots of examples and practice what we are doing I'll stay focused.	Practice and keep looking at my work. I ignore any distractions around me	Grouped work	Panic and stress	I ask others around me and try to listen to examples, then hopefully understand and get the question right.	Things I haven't seen before	I try to think about what I know that is similar. I might ask a partner what they are thinking	Yes. But I don't really lose concentration. I like working	I write a lot, I talk to the teacher about what I'm thinking. I like to compare ways of working things out.	Working in groups. I work better on my own or with one other	A bit stressed but I can get to the answer most of the time.	I remember to take my time and try different ways to work something out. Everything is connected and there's always a way.
K	None	I don't need to	No. Sometimes	I make sure I listen	If people are noisy or talking or calling my name	I don't find any questions difficult	I just leave them	Homework makes me anxious. I don't have anyone to help me at home. In lesson I feel anxious in a test.	I don't. I just worry. And start talking	No.	I don't think I concentrate well.	Noise and people being silly	I can do them. I like them. But sometimes they are annoying	I do some working out on my own. I'll ask the teacher to check.
L	I don't like speaking in class	I try to tell myself good things	Yes, I think I do know. I find myself not listening or chatting	I try to listen to the teacher	People being noisy or chatting. Or if something is too hard to answer	I worry that I can't start them. I don't like making mistakes	I'll try. I don't like asking for help.	Getting asked a question (in front of people). I know I'll get it wrong.	I don't. I try to be quiet and not be asked questions.	Yes	I listen. I write examples carefully. I try to follow things the teacher says	People talking.	They make me worry. But sometimes they aren't as hard as they look.	I will read the question a few times. I read my examples too.

	Pilot Cycle Pre-Intervention						
M	I don't feel anxious	Can't do anything	No	Music helps. I do try to listen to the teacher but it's so hard not to get distracted.	Friends talking to me. Other people distract me	I worry a bit that I can't do it. Or I just get angry	I ask the teacher.
N	Coming up to the board to do working out	Do the work then I feel less anxious	Yes - I know when I'm distracted.	I try to keep looking at the paper or questions	My friends talking to me makes me distracted	I feel sick.	I ask the teacher
O	I feel anxious all the time in case people judge me for giving answers.	I try to daydream stuff that makes me feel better	I think so	I pay attention in my lessons - a bit.	My negative thoughts stop me focussing	I ask for help because I feel helpless	I try my best. I sometimes ask for help.
P	I don't get anxious	I don't need to do anything	I am - but sometimes maybe not.	Look at my book more	I don't lose focus	I quite like difficult questions	I try the question and keep working.
Q	I don't feel anxious	Don't do anything	I am - When someone talks to me a get distracted from work and just talk or other stuff	Does not happen	Does not happen [contradicts answer 3]	I don't feel anything. I try the question	I try the question
R	I don't worry	Nothing	No	Nothing	Nothing. I always focus	I don't like them	I don't need help. But sometimes I ask.
S	I worry about getting things wrong	Give things a go.	Not really. I sometimes concentrate well.	I try to answer the teacher's questions	If the room is noisy. People talking.	I am ok. I try the question	I do ask for help. I like my work checked. Sometimes I can't start a question and I ask then.

	Pilot Cycle Post-Intervention						
M	Getting asked questions. I get all hot and it annoys me.	Working in a different room. I need space. Or music	No.	I listen to music if I work alone. In a class I can't concentrate.	Working in a class with certain people [friends]	I worry. I tell myself I can't do it. I feel stupid but sometimes I feel ok.	I do try my best I just find it so hard. I get distracted if something is difficult. I look around. And talk.
N	Getting things wrong	I try to relax, do the work and hope I get things right.	Yes	I work well I think. I work on the questions in front of me. I'll ask the teacher to check my work so I know I'm doing ok. Sometimes I ask a friend what they got and they I know I can carry on.	People talking. If a friend talks to me.	I do worry. I struggle to start but then it's ok. I know I get things right . I have ticks in my book too.	I ask for help to start or use my book for help.
O	I worry around new people.	I'll talk to the teacher.	Yes	I listen. I talk to the teacher when I like them. If they are nice	Thinking people don't like me.	I worry I can't do it.	My teacher shows examples or reads the question out.
P	I don't worry	I don't know. I read things over and over. I'll stare a bit.	Yes	Look about and see people working	Starting the work. I get into it.	I don't mind.	I'll try to find an easy way to answer it.
Q	I don't get anxious. I think I can do most things	I don't need to.	Yes	If people talk to me I get distracted from work. It's hard to ignore people talking.	I need reminding to do it (focus).	I don't worry too much	I'll try it. I like to be told which question to do. And to know it is hard.
R	I don't worry. It's silly	No need	Yes	If people help me I can concentrate.	People talking. Not doing things I want	They are silly. Sometimes ok. Annoyed.	Nothing. Tap.
S	I don't worry much. I like knowing things	Think of something funny	Yes	I write everything down.	People saying my name. Noises outside.	It's ok. I can do them.	I write down my work. Make it clear. Read my book.

Cycle Two Responses

	Cycle Two Pre Intervention								
	1. What activities in Maths make you feel anxious? Why?	2. Do you feel anxious in other lessons, and why?	3. What do you do to reduce anxiety if you feel it?	4. What do you do to maintain concentration?	5. Are you aware of when you lose concentration?	6. What might cause you to lose concentration	7. How do you feel about difficult questions in class?	8. When you come up against a difficult question and feel ready to try it, what do you do?
AA	Some algebra	Science specifically, chemistry and physics	I don't know	Listen to the teacher	Not really	When other people talk to me. When I sees something more interesting	Nothing really. It let's me know what I need to work on	If I can't do it I ask for help.
BB	Surds. They don't make sense	English in general makes me anxious as well as Biography [Biology].	Listen to music	Interact with the teacher	Yes	People around me	Alright, but would need a good brief through	Flick back in my book to when I did the subject. Ask my partner of teacher
CC	Surds. I don't understand them.	In other subjects I don't feel anxious but I get nervous when it comes to explaining	When I feel nervous, I just calm down	Look straight [ahead]. Remove any distractions	Yes	Some thoughts	I try to understand it then answer it. I don't worry	I think quickly and consult my book and my knowledge
	Surds.	English	Nothing	Not speaking	Yes	When I don't understand the question	Bad	Use my book
EE	Surds.	English	Breathe in and out	Listen	Yes	Dunno	Nerves	I talk to people to help
HH	None	No	No. Except the harder subjects	I ignore people [who are stupid]	Yes	Other people	They're hard. So it's stressful	I write it down. Like it to be checked
II	When a question is hard	No. Except the harder subjects	I listen to music or hum.	I ignore people [who are stupid]	Yes	Other people	They're hard. So it's stressful	I write it down. Like it to be checked
MM				Not sure	Yes	People speaking to me. Or not knowing what to do	Good because it challenges me but bad if I don't know what to do	Think to myself 'I can do it' then refer to my book
OO	Things I don't know	Yes, group activities	I give up	Not sure	Yes	People speaking to me. Or not knowing what to do	Good because it challenges me but bad if I don't know what to do	Think to myself 'I can do it' then refer to my book

	Cycle Two Post Intervention								
	1. What activities in Maths make you feel anxious? Why?	2. Do any other subjects make you feel anxious, and why?	3. What do you do to reduce anxiety if you feel it?	4. What do you do to maintain concentration?	5. Are you aware of when you lose concentration?	6. What might cause you to lose concentration	7. How do you feel about difficult questions in class?	8. When you come up against a difficult question and feel ready to try it, what do you do?
AA	Algebra - I'm not good at it	No	Nothing	I don't know	No	My friends. I don't know, specifically	I try them. I don't mind if I get them wrong	I just try it
BB	I don't know	Whole class work makes me a little anxious because people giggle when you get an answer wrong	Ask the teacher for help	Interact with the teacher and contribute	Yes	People talking	I don't mind them so long as I know I can have help	I remember I can ask for help if I need it.
CC	All of it. It can be overwhelming	Subjects with too much to learn. Too much content like geography or biology or english	Ask the teacher for help	I talk the work through	sometimes	People talking, outside noises, phone vibrating	I think 'I can't do this'	Deep breaths and try my best
	Surds because they are confusing	Sharing answers makes me anxious	I try to relax. But it's hard	I try not to daydream	Yes	Loud noises or if I am struggling, I start to lose concentration	I usually skip them	Use my book
EE	Talking in front of the class	I don't know. Maybe talking	I breathe deeply. I stay quiet. I might leave the room	Ignore who is being loud	No	Other people, noises. If I don't understand	Ok. I might not do it	I don't know.
HH	Harder questions	If they are hard. If I need to answer harder questions	I leave. Walk about.	Tell people to be quiet.	Yes	People talking. Or loud noises.	It's ok. I can sometimes do them	I write it down
II		yes in all lessons.	I ignore everyone and kind of give up but ask for help sometimes	try to avoid communicating with others	Yes	when my friends speak to me or there is something going on.	I try to answer them to challenge myself. But sometimes get stressed.	I use notes from the lesson to help me and ask the teacher if I don't understand.
MM	Group work or answering in front of the class. Because I feel there is more people to judge you and more pressure to get the questions right.							
OO								

	Cycle Two Pre Intervention							
OO	Not too good with trigononemtry	Not really	If I am out of school, things like sports or games.	Just try to focus and talk to classmates when necessary	Yes	Talking to others about things not related to work.	Not too bad. Try my hardest	Use my book first. If I still can't get an answer, ask a friend for help.
PP	I struggle in homework marking because it is done by myself so it is more likely to be wrong	Activities in science, especially when it is a random pick because that is pressure	I try to sit still and I try to breathe before speaking	I sit at a seat which has people that I don't normally speak to outside of lesson, so I can maintain concentration	Yes, If I don't understand something after the second time it is explained	Distraction from other students	I don't get anxious until I have to answer, then I start to panic	I try to breathe and look at my book.
QQ	Answering questions in front of the class and being put on the spot	Exams in general stress me out a lot and I tend to forget everything I know	Fiddle with my fingers or take deep breaths	I try to tie my hair up and just try my best to not get distracted	Yes, and then I feel bad after the lesson for not giving my 100%	Difficult questions or someone starts talking to me.	I really dislike them and if I get them wrong in front of everyone it makes me question my abilities	I use my book and try to attempt the questions
RR	I don't really feel anxious in lessons but I tend to forget a lot of content depending on the teacher I have.	No	Read over notes	Just keep listening to what the teacher is saying	No, not really	If the lesson is not that appealing	If I know it I say it, if I don't then I say I don't	Use my book
SS	None	I like small group work because I feel people listen more rather than a whole class. I think anytime I get something wrong people will laugh.	I don't feel it.	Avoid talking	Sometimes because I may be talking over someone and not realise	If someone is being silly I would laugh or just someone talking to me	I don't like answering them. People might laugh at me	I use my book and I ask the teacher for help
VV	single work or sometimes in groups	sharing answers, classwork	I fiddle with something in my hand.	ignore people	Yes	noisy people	I like them.	I use my book
WW	I don't know. Other people sometimes	I think so. When I don't know what is happening	I think about something else.	I move about sometimes. Or change desks	Yes	A lot of noise.	They aren't good. I get stuck	I'll write down what I'm thinking

	Cycle Two Post Intervention							
OO	Nothing - but I do find shape questions difficult	No	My hobbies, football and sports and games	Avoid talking to friends and stay focused	Yes	Sitting with friends	Try my best to answer	First, try it. If I struggle use my book. If I don't know the answer I'll ask for help from a friend. If they don't know I'll ask the teacher
PP	Do now [starter] topics we haven't done for a while because I tend to forget	Sometimes in music because the class is only about six people	Ask the teacher to repeat the question so I can have more time to think	Less talking and more concentration	Yes, when I start to forget what I just did	Group work	To think out side the box. It's ok	Tell me partner, to find out how much we agree or disagree
QQ	answering questions	no	take deep breaths	I try to remember it's ok to get things wrong.	Yes	My friends	I try to do them to the best of my ability	Use my book
RR	I don't think many activities make me anxious however sharing answers to the class can.	Sharing answers on topics i am not keep on.	For sharing answers with class I just say what i think then if i am wrong I correct it in my book.	Try and listen as much as I can to the teacher.	Sometimes i am not aware but most of the time when I look up and notice the teacher teaching I start to concentrate	People talking or sometimes i fiddle with things like my pen.	I try it but if i don't get it then I either ask for help or wait for the teacher to say the answer	If I feel like I can do it I will try, however if I get lost, most of the time I will ask my partner or the people around me.
SS	None	I don't mind sharing answers in any class	Talking to a good person I know, about it [the questions]	I listen and focus on my own work. I like my work to be neat so I concentrate on that	No	If someone is silly or talks to me	I feel ok	I write down what I think carefully and slowly
VV	Algebra and it and it because I always get it wrong. It is a problem for me	Sometimes group work	Asking for help so I can get answer correct	Doing maths games I like, it makes it a lot easier.	No - but I do daydream	Things like random sounds and daydreaming	I get stuck and then I skip it and then I don't do the rest	When I try but fail I check my book for help and then ask my friend and if they can't help I ask miss.
WW	I'm not sure. It's hard	Not sure how to expla	Stay quiet	Chew gum or shuffle my legs up and down	Yes	Sudden noises or if I don't know how to explain the answers	annoyed in case I get	talk to my partner

Appendix C: Student Interviews

Pilot Interview

Focus First Cycle - Year 7			
Speaker	**Comments**	**Question Theme**	**Response Themes**
Teacher	So, the first question, and you can say or you can pop your hand up if you want to, or you can just say your letter and go 'K' and say what you feel.	Self-efficacy	n/a
	Um, the first question I am going to ask you is if anyone tell me how they feel when they come across something difficult in class?	Self-efficacy	n/a
	Yes, what's your letter?	Self-efficacy	n/a
Student M	M	Self-efficacy	n/a
Teacher	Lovely	Self-efficacy	n/a
Student M	I find them really annoying. I just look around and get really hot or whatever. It's just really annoying.	Self-efficacy	Hard questions: physiological response. Annoyance. Affective response to anxiety
Teacher	Ok, that's interesting. So you get quite a physical reaction? I think that's quite common	Self-efficacy	n/a
Student M	Yeah, I just get really angry.	Self-efficacy	Hard questions: anger. Emotion. Affective response
Teacher	Yeah	Self-efficacy	n/a
Student M	I get in a mood.	Self-efficacy	Hard questions: anger. Moody. Affective response
Teacher	OK, does anyone else feel they get that when something is difficult? Does that happen to [your] body?	Self-efficacy	n/a
Student K	I sometimes feel that in Spanish when it's a really hard question or a teacher puts me on the spot. I just hate her. Or I want to jump out of the window.	Self-efficacy	Hard questions: anger, hate. Emotion. Affective response
Teacher	Interesting, so like fight or flight, like, quite exteme terms.	Self-efficacy	n/a
Student L	I wait until someone can tell me or show me the answer	Self-efficacy	Hard questions: cognitive response. Help seeking. Passive
Teacher	OK, so you look around. It sounds like you'd be quite quiet?	Self-efficacy	n/a
Student L	Yeah, I just think oh god am I going to get this wrong.	Self-efficacy	Hard questions: worry about failure
Teacher	Yeah. Ok.	Self-efficacy	n/a
Student K	And with homework, if I don't do it I get detention and if I get a detention my mum will slap me.	Self-efficacy	Homework: parent involvement
Student M	laughter.	Self-efficacy	n/a
Student K	Well, she wouldn't slap me, she'd just murder me probably and take my switch away probably	Self-efficacy	Homework: parent involvement
M	That's animal abuse	Self-efficacy	n/a
Teacher	They're very different. Murder and taking away your switch. Pretty different, um, different things.	Self-efficacy	n/a
Teacher	Ok, so year 7s how do you think you feel like that Why do you think you get that physical reaction? The sweating, the hotness, why do you think you get that when something is dfficult?	Self-efficacy	n/a

M	Miss, I've had it my whole life and I think I get it because of my mum.	Self-efficacy	Hard questions: reaction of affective anxiety linked to parent involvement
Teacher	Ok, why. Can you expand on that?	Self-efficacy	n/a
M	Well miss, I'm very depressed. I'm very depressed. And annoyed. I get bullied a lot. And at my old school. And um, I got bullied a lot and I used to bully other kids as as well. (Tone- playful and exaggerated)	Self-efficacy	Hard questions: affective. Negative interactions with peers
Teacher	Ok, interesting	Self-efficacy	n/a
	So, when I got bullied I started bullying other people and I started getting angry in class and feeling dumb	Self-efficacy	Hard questions: affective. Negative interactions with peers
Teacher	So, is that a response to things being difficult in class?	Self-efficacy	n/a
M	Yes, it's just annoying. I keep on thinking about it [the bullying].	Self-efficacy	Hard questions: affective. Negative interactions with peers
Teacher	Um, ok, thinking about something maybe a little bit different. What helps you concentrate? So when you do, because everyone can concentrate sometimes, why is that? What helps you? Um, M?	Self-regulation	n/a
M	Music helps me concentrate a lot especialy when I have my headphones in and no one is looking at me. It just helps me a lot.	Self-regulation	Concentration: avoid peers, distract with music
Teacher	OK	Self-regulation	n/a
M	And I don't like it when people speak to me. I know that might sound really rude but I don't like it and it just, like, gives me so much more anxiety. Music is, like, the only thing. Especially my play list. Which is the best thing ever, and yeah.	Self-regulation	Concentration: avoid peers, distract with music. Peers create anxiety
Teacher	Ahh, K.	Self-regulation	n/a
K	Um, not breathing.	Self-regulation	Concentration: control breathing. Physical response
Teacher	Ok, what do you mean?	Self-regulation	n/a
K	Like, I don't breathe.	Self-regulation	Concentration: control breathing. Physical response
Teacher	Oh, ok. So does tht help you concentrate?	Self-regulation	n/a
K	Because even like, because in my primary because, basically my entire class at lunch and break we would all play manhunt and it's so fun and it's sometimes scary because we'd be trapped in the corner by like five thousand people and like chased by everyone and, like, if. I don't breathe I just like...	Self-regulation	Concentration: self-control
Teacher	Ok. So is it like slowing down your breathing? Kind of taking a proper breath and slowing it down?	Self-regulation	n/a
K	I just stop breathing and like pass out.	Self-regulation	Concentration: control breathing. Physical response
Teacher	OK. Um, M do you have something to add?	Self-regulation	n/a

M	Ok, so I have and still have a really bad chest pain. I had a chest infection and had it when I was a baby and I stopped moving and my mum thought I was gonna die. And I have heart issues as well. And it's like, I used to speak about it a lot but I don't like speaking about it with my friends. There's literally like one person. ANd one in year 5 we were playing It and they tripped me over and I smashed my head on the floor and I started screaming and after that I passed out on a chair in the thing. I did!		n/a
Teacher	Ok. So, just pause a second. Let's pull this back round to concentration.		n/a
M	But miss, that makes me stop concentrating because of my heart pain. And (xxxx) makes it worse.		Concentration: difficult due to physical needs
all	(noise from students)		n/a
Teacher	Uh, uh, calm down.		n/a
Teacher	Oh, ok. Can you think of somebody in your class that is really focused and think about how they stay focused?		n/a
K	Not me		n/a
Teacher	Ok, and can you think of somebody who IS focused.		n/a
Teacher	Why would someone stay focused what would they do or not do?		n/a
L	xxx concetrates really well.		n/a
Teacher	Ok, how does she behave?		n/a
L	She's really smart		Concentration: intelligence helps people concentrate
Teacher	Ok, so you think it's her ability that helps her focus?		n/a
M	Yes, I do.		n/a
Teacher	Ok, interesting. What would help you? What would help you focus?		n/a
K	Minecraft		Concentration: lack of concentration - distraction seeking
Teacher	What would help you focus on the learning?		n/a
M	it wouldn't help you.		Concentration: state distraction does not help
K	It would. It would help me because it is calming.		Concentration: staying calm. Affective response
Teacher	What about something that isn't also a distraction from learning?		n/a
L	I like fidgeting with stuff when I get distracted easily. It sometimes distracts me too.		Concentration: distraction, fidgeting
Teacher	I think that's a really good point.		n/a
M	I fidget with blue tak		Concentration: distraction, fidgeting
Teacher	Yeah, I think. I think people do get distracted really easily and sometimes that can almost calm you down for a bit. I mean case in point here (gestures to a student who is playing with some blue tak)		n/a
K	Sometimes I put a pen under a chair leg, on the floor. And it's so nice when it crunches.		Concentration: distraction, fidgeting

Teacher	Is there anything other people could do to help you concentrate?		n/a
M	Not speak to me.		Concentration: avoid peers
Teacher	Ok, so reduce the conversation in the class.		n/a
M	And let me out the classroom when I'm annoyed		Concentration: awareness of environment
L	But you're the one talking. You talk all the time though. (directed at M)		n/a
Teacher	Hmmmm, you might be onto something there!		n/a
M	Yeah, but miss if you took me out of the classroom when I started getting annoyed maybe that would calm me down. But people don't do that anymore.		Concentration: staying calm. Affective response. Difficult to do
Teacher	So, hang on. Backtrack. Did you say to talk you out when you are getting annoyed to give you a bit of space?		n/a
M	yeah, let me leave the classroom and be somewhere where there are no people.		Concentration: avoid peers. Calm
L	Yeah, when you're angry you just need space.		Concentration: affective responses stop concentration
Teacher	And is it true that you're not always given that space?		n/a
M	yeah		n/a
Teacher	But it would help. So what would a teacher say to you to help? How would it sound?		n/a
M	Like, go out and take five minutes		Concentration: avoid peers. Calm
L	Yeah, take five minutes.		Concentration: avoid peers. Calm
Teacher	Without anyone around?		n/a
L	Yeah.		n/a
Teacher	And do you think that would be enough. To relax on your own and come back?		n/a
L	Yeah, and frezsh air always helps.		Concentration: awareness of environment, calm
M	You know we could have a lanyard that just lets us out for 5 minutes. And you can literally just come back.		n/a
L	An out of lesson pass.		n/a
Teacher	yeah, I know what you mean.		n/a
K	But you'd probably just skip the entire lesson		n/a
L	No, the reason I skip is because when I'm late to class I don't want anyone staring at me when I come in. I can't come through the door.		Avoidance: peers
Teacher	Ok		n/a
M	Yeah, I hate when that happens. You walk in and everyone stares at you.		Avoidance: peers
Teacher	That's really interesting, thank you.		n/a
M	Why do people make us do that? (muttered)		n/a
Teacher	Um. Are you sometimes on time for lessons and then is that easier or harder?		n/a
L	Easier		SR: easier when organised. Punctual

Teacher	So if you get there first and you're already in there does that make it better?		n/a
K	Yeah.		SR: easier when organised. Punctual
Teacher	I get that because it's a bit like comnig into a meeting late. I hate that as well		n/a
K	Some people just are really loud when you come in and point it out. So I lap		Avoidance: peers
Teacher	OK. So you lap for a reason. That is that you don't want to come in because people will stare.		n/a
M	Yes, I was lapping earlier with L and it is better than being in lesson. You have more space.		Avoidance: peers
Teacher	Hmmmm. Can I ask you one final question? When a problem is difficult, and let's use maths as an example, when a problem is difficult what goes through your head?		n/a
K	I can't do it.		Hard questions: cognitive negative. Can't do it
Teacher	Yeah? Ok, is that like an internal automatic response? You can't control it? We all have internal thoughts and tell ourselves things. What do you tell yourself?		n/a
M	I need to leave. And then if I can't leave I'lll just stop working and put my head on the table. (turns to L) What is wrong?!		Hard questions: cognitive negative. Can't do it. maladaptive
Teacher	Ok try to stay calm. That was a useful response, thank you M.		n/a
Teacher	K?		n/a
K	I look for a pencil to snap		Hard questions: distract
Teacher	Ok, so you might look for something to kind of distract you a little bit.		n/a
K	And um, if I if it's like spanish work. I try so hard and I can't do it so I just throw it on the floor. And um. Yea.		Hard questions: cognitive negative. Can't do it. Maladaptive
Teacher	Ok		n/a
K	Yeah, it's bad.		n/a
L	And miss, I have anger issues so it helps me if I break something.		Hard questions: anger, hate. Emotion. Affective response
Teacher	I see you so almost need something that doesn't matter that can take that anger		n/a
L	Yeah. I have anger issues and ADHD but I can control my anger issues		n/a
Teacher	Ok, well that's good.		n/a
K	I just tell myself I'm so dumb, I'm not going to get it right. I don't even know the answer.		Hard questions: cognitive. Self-talk. Dumb. Can't do it.
L	Yeah, I'm like oh my gosh, oh my gosh.		n/a

END OF TRANSCRIPT – PILOT INTERVIEW

Cycle Two Interview

Focus Group Second Cycle - Year 11			
Speaker	**Comments**	**Question Theme**	**Response Themes**
Teacher	So just a few questions in terms of how to deal with difficult situations, what you find helpful and how you feel about learning in general. If there are any situations that cause you a but of stress. And I can see from your feedback that you kindly wrote that there are some common challenges such as talking in front of a group so thank you for doing this.		n/a
Teacher	I do have a question before we begin properly. Does it make a difference how big the group is?		n/a
HH	It' s harder to talk in a bigger class?		Group size: larger is harder
Teacher	OK ,why do you feel that?		n/a
FF	More people		Group size: larger is harder
Teacher	Ok, what makes it worse when there are more people?		n/a
FF	People judge, they look at you.		Group size: larger is harder. Peer judgement
Teacher	Ok, so you think a larger class, it's more likely someone in there will judge?		n/a
HH	But it also depends who is in the group when it is smaller as well.		Group size: who is in the group matters too. Judgement from some people in any sie group
Teacher	yeah, it does		n/a
HH	if I don't know them or I'm not comfortable with them I won't talk in front of them.		Peers: unknown then won't talk
Teacher	Ok, so maybe we're just quite lucky in this group. You all sort of know each other a bit and trust each other?		n/a
Teacher	So, more general, and answers don't need to be about maths in particular. When you are given something difficult to do does it provide any feelings in you? So if I give you a difficult question, is there anything physical or emotional that happens?		n/a
II	I feel nervous. If I'm not sure what to do or how to start.		Hard questions: affective. Nerves. Anxiety
Teacher	OK. How do you behave when you feel nervous? What do you do?		n/a
HH	I tend to just like play with my hands and look down.		Hard questions: cognitive distraction
Teacher	Ok, why do you think something being difficult prompts those things?		n/a
HH	I feel anxious, and I just fidget to distract myself		Hard questions: affective. Nerves. Anxiety. Then look for distraction
Teacher	Ok, and then do you hope it goes away?		n/a
HH	Yeah, but it doesn't!		Hard questions: anxiety stays. Distraction doesn't work
Teacher	Yes, ok. I see.		n/a
Teacher	When it comes to concentrating in lessons is there anything you do that really helps you? Well, firstly do you know you're not concentrating or do you suddenly realise and go 'hah, I'm daydreaming'.		n/a

II	It happens suddenly. I'm like concentrating and then I realise I've not been paying attention.		Concentration: unaware when lost
Teacher	What do you do when you realise you've not been paying attention?		n/a
II	Just starting listening and try to catch up		Concentration: listen refocus
Teacher	Ok, so maybe hope you can fill in the gaps?		n/a
II	Yeah, I do. I just hope.		n/a
Teacher	Which is great. That's a really mature approach to trust in yourself that you can catch up.		n/a
Teacher	Does anyone else have any things they do when they realise they haven't been concentrating?		n/a
FF	I just give up because I think if I've missed a bit I'm not going to understand the rest.		Concentration: lost then gives up.
Teacher	Which is really interesting. Because I think, knowing you, you could know the rest. But that's a self-belief approach, isn't it?		n/a
FF	Mmmm		n/a
Teacher	Which can grow and be addressed.		n/a
Teacher	Is there someone you can think of who focuss really well? Loads of you in here are great at this too, but thinking of another person, how do they focus?		n/a
FF	They probably just ignore everyone		Concentration: avoid peers
Teacher	Yeah, maybe ignore the chatter		n/a
II	Just keep focused on the work and ignore people. They don't get distracted		Concentration: avoid peers, focus
Teacher	Hmmm. Yeah. When someone tries to get your attention in class is it easy to ignore them?		n/a
FF	No.		Concentration: hard to ignore peers
Teacher	How does it make you feel? Because peer pressure is a thing.		n/a
HH	yeah, it depends who it is. And where they are. You know the people who turn around and they've already finished their work and just want to chat.		Concentration: peer disruption
Teacher	Ha, Yes.		n/a
Teacher	Is there anything you think the school or teachers could do that would help you concentrate? And on the flip side is there anything that really makes you lose concentration - so a certain activity where you find it hard to focus.		n/a
II	I think when teacher just talk for ages and don't really engage the class.		Concentration: hard when bored - teacher talk
FF	Yeah		n/a
II	And it helps when teachers actually check you understand it. They make sure you're following and understand the work.		Concentration: teacher check in helps
Teacher	Yeah. How do you like teachers to check that you understand?		n/a
FF	Just come round and look and ask.		Concentration: teacher check in helps
Teacher	Ok so more one to one and subtle, not in front of the class? So not xxx can you explain this please? But do you know why we sometimes cold call and spot check?		n/a

II	I guess the class size. You can't go and talk to everyone.		n/a
Teacher	Yes, that's true. We can't go round to everyone and check one to one in a large group.		n/a
Teacher	Ok, so the final questions are to do with how confident you are when you see something difficult. So, I don't know if you have this but most probably do, your internal monologue - what you keep telling yourself over and over.		n/a
Teacher	If you're given a difficult question is there stuff you say to yourself? And are you happy to share?		n/a
FF	I just say I'm not going to do it.		Hard questions: cognitive. Avoid
Teacher	Is that what you say. What you tell yourself.		n/a
FF	Yeah, if I look at it and think it looks difficult, and I don't know how to do it I just won't do it.		Hard questions: cognitive. Avoid
Teacher	Are there any situations where you've overcome that? I'm going to go for it.		n/a
FF	yes, if the teacher comes over and explains it and tells me I can do it then I'll try it. And I'll do the work		Hard questions: need teacher help
Teacher	Yeah, isn't that interesting that teachers have more confidence in you than you do?		n/a
Teacher	How about you both (pointing at two students). I is there anything you tell yourself when something is difficult?		n/a
II	I don't know. I just try it and then if I can't do it I'll go to another question.		Hard questions: effort,
Teacher	Oh ok. And maybe come back to it?		n/a
II	Nods		n/a
Teacher	H, is there anything you do?		n/a
HH	I just skip it and wait until the teacher comes back to the whole class and goes through the answer.		Hard questions: avoid, teacher help
FF	Yeah, exactly		n/a
Teacher	Ok, are there any other things you'd like to share about learning and what helps? What doesn't? What teachers do well to support you, or not?		n/a
FF	I like how, you know at the beginning of these lessons we have a starter on something we have done previously?		Previous learning recap helps
Teacher	Yeah		n/a
FF	It helps me feel confident, like instead of launching into a new topic I can look back on something and see if I still know it?		Previous learning recap helps build confidence
Teacher	Mmmmm. Yeah. Do you do that across subjects generally?		n/a
FF	Some teachers do it.		n/a
Teacher	Yeah, how does everyone else feel about that technique or activity?		n/a
HH	yeah, it does help. You remember things you've done. It feels good.		Previous learning recap helps build confidence
Teacher	Yes, I can see that. You can have a mini lesson on it at the start too, if you struggle but others are ok. So it can be a helpful boost to confidence and learning.		n/a

Teacher	Thank you, that was really helpful .Is there anything else that might happen in the main body of the lesson that is really helpful?		n/a
II	Extra sheets - you know like these ones? Some work to take that isn't compulsory but you can do and can practice what we need when we need.		revision and practice helps confidence. Independent work
Teacher	Yeah, I see. It can help encourage some independent working at home.		revision and practice helps confidence. Independent work
Teacher	Do you know, um, where to find work if you need it for each subject?		n/a
FF	It depends cos like, with Maths we've got Hegarty maths but then sometimes there are clip numbers and we don't know it so we only do it when it's homework. Or like there are websites but I think revision sheets are more helpful. And you can always go back and look at it online.		Tools for revision and homework
Teacher	Hmmm, yeah.		n/a
HH	Online only helps to a certain extent, if you kind of know what to do. But you can get stuck and a teacher is the best to help.		Independent work or homework difficult when stuck
II	And online it just takes longer. You have to search it up and then there might be problems. It's quicker if you have the work right in front of you.		n/a
Teacher	Yes, I can see it's a barrier once you're online. You have to go through steps to get to the work and once you're online you're online. There are distractions and suddenly 20 minutes have gone by. So it is good to have the physical paper and disconnect from tech.		n/a
FF	Yeah miss. And like if it's online and I don't know how to work it out I'll have to work it out on paper and I'll have that piece of paper and it just has something on it and I'm like what's that for when I look later. It's confusing		regulation and organisation: Preference for physical work over online to help organise
HH	I find the videos really help. You follow it then replace the numbers with new numbers and make sure you understand.		efficacy: online work helps access work and practice until it is understood
FF	Yeah but it's the same question. What if it's a different question.		online work - challenge if it's different or difficult
HH	Well it's so easy to find answers online so If I'm really stuck I can just search the question and find out.		efficacy: use online tools to work out answers independently
Teacher	That is true.		n/a
HH	But it doesn't really help sometimes. I might know the answer but not understand it.		efficacy and mastery: need to understand and not just know the answer
Teacher	Yeah, hmmm. Printing out can be so helpful and quick, and then the online help or teacher help is there when you need it.		n/a

END OF TRANSCRIPT – CYCLE TWO INTERVIEW

Appendix D: Coding Example

All responses to a question were read several times.

Themes were picked out. In this instance, the themes were related to anxiety in a subject.

I placed a code next to each response e.g. peers.

I re-read the responses to ensure all responses matched a code and were correctly assigned.

I checked the codes for overlap in case a response belonged in two categories.

I then tallied how many responses matched each code.

Percentages were calculated using the number of students in the cycle, providing the percentage of students in the cycle that gave a specific response.

2. Do any other subjects make you feel anxious, and why?	2. Code
No	Anx-none
Whole class work makes me a little anxious because people giggle when you get an answer wrong	Anx-peers
Subjects with too much to learn. Too much content like geography or biology or english	Anx-subject
Sharing answers makes me anxious	Anx-peers
I don't know. Maybe talking	Anx-peers
If they are hard. If I need to answer harder questions	Anx-hard
yes in all lessons.	Anx-all
No	Anx-none
Sometimes in music because the class is only about six people	Anx-peers
no	Anx-none
Sharing answers on topics i am not keep on.	Anx-peers
I don't mind sharing answers in any class	Anx-none

Findings and Discussion

Appendix E: Causes of anxiety

	Total Pilot Anxiety Causes	Total Cycle Two Maths Anxiety Causes	Total Cycle Two Other Subjects Anxiety Causes	Total Anxiety Causes
Specific topics	0	9	4	13
Peers	17	8	12	37
Hard questions	0	5	2	7
Homework	1	1	0	2
New ideas	2	0	0	2
Exams	2	0	1	3
Failure	7	0	0	7
Everything	0	1	1	2
Unsure	0	2	2	4
No anxiety	15	4	8	27
Total	44	30	30	104

Appendix F: Responses to anxiety

Pilot cycle two total frequencies of reported strategies

Strategies in Anxiety Pilot	Pre and Post Count	%
Self-calm	3	8
Use book	1	3
Focus/listen	7	18
Effort	6	16
Distraction	5	13
Seek help	4	11
Work avoidance	4	11
Peer avoidance	2	5
Do nothing	4	11
N/A (no anxiety)	10	26
Unsure	0	0
n = 19		

Strategies in Anxiety Cycle Two	Pre and Post Count	%
Self-calm	8	29
Use book	2	7
Focus/listen	1	4
Effort	0	0
Distraction	5	18
Seek help	6	21
Work avoidance	4	14
Peer avoidance	1	4
Do nothing	3	11
N/A (no anxiety)	1	4
Unsure	1	4
n = 14		

(pre +post)	Pilot (count)	Pilot (%)	Cycle Two (count)	Cycle Two (%)	Combined %
Cognitive	20	53	14	50	52
Affective	8	21	13	46	32
No Anxiety	10	26	1	4	17
Unsure	0	0	1	4	2
	n = 19	n = 19	n = 14	n = 14	

Appendix G: Strategies in anxiety

Comparing pre and post intervention questionnaires across both cycles

Strategies in anxiety	Pilot Pre Intervention n = 19	Pilot Post Intervention n = 19	Cycle Two Pre Intervention n = 14	Cycle Two Post Intervention n = 14
Self-calm	1	2	5	3
Use book	0	1	1	1
Focus/listen	4	3	0	1
Effort	3	3	0	0
Distraction	1	4	4	1
Seek help	1	3	0	6
Work avoidance	1	3	1	3
Peer avoidance	0	2	0	0
Do nothing	2	2	1	2
None (no anxiety)	7	3	1	0
Unsure	0	0	1	0
Total	20	26	14	17

Appendix H: Anxiety responses pre- and post-intervention

Anxiety Response Count	Pilot Pre-Int	Pilot Post-Int	Cycle Two Pre-Int	Cycle Two Post-In
Cognitive	8	12	5	9
Affective	4	5	7	6
No Anxiety	7	3	1	0
Unsure	0	0	1	0
	19	20	14	15
Anxiety Response Percentage	Pilot Pre-Int (%)	Pilot Post-Int (%)	Cycle Two Pre-Int (%)	Cycle Two Post-In (%)
Cognitive	42	63	36	64
Affective	21	26	50	43
No Anxiety	37	16	7	0
Unsure	0	0	7	0

Appendix I: Anxiety strategies pre-and post-intervention

Strategies in Anxiety	Pilot Pre (%)	Pilot Post (%)	Cycle2 Pre (%)	Cycle2 Post (%)
Self-calm	5	11	36	21
Use book	0	5	7	7
Focus/listen	21	16	0	7
Effort	16	16	0	0
Distraction	5	21	29	7
Seek help	5	16	0	43
Work avoidance	5	16	7	21
Peer avoidance	0	11	0	0
Do nothing	11	11	7	14
N/A (no anxiety)	37	16	7	0
Unsure	0	0	7	0

Appendix J: Self-efficacy

Self-efficacy strategies	Cognitive Responders Pre-Intervention	Cognitive Responders Post-Intervention	Affective Responders Pre-Intervention	Affective Responders Post-Intervention	No Anxiety Response Pre-Intervention	No Anxiety Response Post-Intervention
Use book	5	9	7	5	1	0
Effort	2	11	2	3	4	1
Teacher Support	3	6	2	1	2	1
Peer Support	3	6	1	3	1	1
General Help	3	4	1	2	2	0
Nothing	1	1	0	0	1	2
Avoid	1	0	0	0	1	0
Distract self	0	1	0	1	0	0
Unsure	0	0	0	1	0	0
Total strategies listed	18	38	13	16	12	5

Appendix K: Intervention Activities

Collaboration Discussions

Stage 1: School Improvement Sessions

The sheet below was presented by senior leaders to the whole school as a model of kinds of questions we might ask students in order to stretch them. Astrid and I used this in our discussions about the kinds of tasks we would design for paired work.

We decided on questions that we would encourage students to ask each other and questions we would use regularly with the students.

Student-student questions
Clarification – Show me another way
Linking/Extending – what could be different? Explore different methods
Summary – discuss what they don't know and why

Teacher-student questions
Explanation
Hypothetical
Metacognition

Questions that unlock thinking

Explanation – Why might that be the case? How would we know that? Who might be responsible for…?
Hypothetical – What might happen if…? What would be the possible benefits/impact of X?
Evidence - How do you know that? What evidence is there to support this view?
Clarification - Can you put that another way? Can you give me an example? Can you explain that term?
Linking and extending - Can you add to what X just said? How does this idea support/challenge what we explored earlier in the lesson?
Summary and synthesis – What remains unknown at this point? What else do we need to know or do to understand this better?
Metacognition – What was the most difficult part of that task? How would you do it differently next time? How could you approach this question?

Think-Pair-Share
- Teacher asks a question
- Students are given time to think about their responses
- Students pair up and discuss their responses

Think-Pair-Share Various Perspectives
State a question and ask pairs to "think" in terms of a different perspective e.g. A character in a story, a particular scientist or thinker, a person from history. Etc…

Think-Pair-Share (Listen) – When students are sharing ideas in their pairs remind them to listen to their partner's ideas. When are asked to share, students share the idea of their partner not their own.

Think-Pair-Silent Share – The students share their ideas as a silent written dialogue in the form of a spider diagram. This allows students to deepen thinking by taking time to present information in a written form.

Think-Pair-Square – Students share with two other students after they have completed Think-Pair-Share (4-square).

Think-Write/Draw-Share – Students write or draw their own ideas paired discussion with a partner. This allows ideas to be developed more before sharing.

Stage 2: Possible Framework 1

This framework for collaborative discussion was discussed with Astrid. In order to build a collaborative culture of learning that is supportive of mistakes, we wanted students to have a framework to feed back to each other.

In discussion, we agreed this was too formal and presented too much to read and understand, which might dilute the purpose of the task. Students may be disinclined to complete this, have too many questions that could ruin the flow of the task. Additionally, this format looked too formal compared to the other lesson tasks, which might jar with how students experience the lesson.

Communication: Give at least one suggestion to improve the communication of the solution. (Focus on explanations, imprecise use of language, organization, labeling, etc. Be specific: don't say "it was hard to follow" or "part 2 was unclear;" say *why* it was hard to follow, *what* was unclear, and *how* to improve it.)

Correctness: Note any errors you found. (Focus on misunderstanding of concepts, misuse of mathematical language, calculational errors, incomplete answers, etc. Be specific: don't just say "part 2 was wrong;" say exactly *what* is wrong, *why* it is wrong, and *how* to improve it.)

(Optional:) What other feedback to you have? How else could the solution be improved?

Stage 3: Chosen intervention tasks to encourage reflection, communication, collaboration, and discussion.

These were used each session to help students frame paired or small group discussions. Students shared their responses and discussed different answer or different solutions that had the same answer.

Partner Reflection

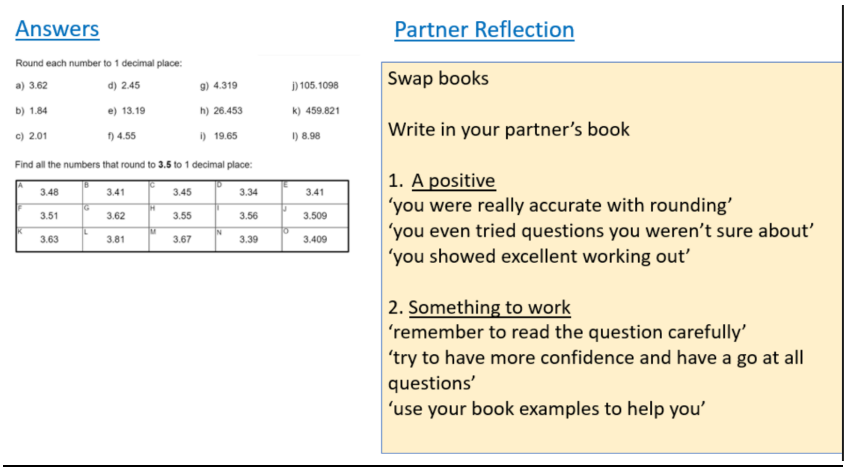
Share your answers with your partner/group of 3.

If you have different answers, circle these.

Discuss the different answers and how you found these.

Students would then provide friendly criticism of each other's work, commenting on accuracy, effort, care, methods. Students were given hint words on the board to help them build comments.

For example:
How much did your partner keep trying?
How much did your partner pay attention to the question?
How much did your partner check their work?



Answers

Round each number to 1 decimal place:

a) 3.62	d) 2.45	g) 4.319	j) 105.1098
b) 1.84	e) 13.19	h) 26.453	k) 459.821
c) 2.01	f) 4.55	i) 19.65	l) 8.98

Find all the numbers that round to **3.5** to 1 decimal place:

A 3.48	B 3.41	C 3.45	D 3.34	E 3.41
F 3.51	G 3.62	H 3.55	I 3.56	J 3.509
K 3.63	L 3.81	M 3.67	N 3.39	O 3.409

Partner Reflection

Swap books

Write in your partner's book

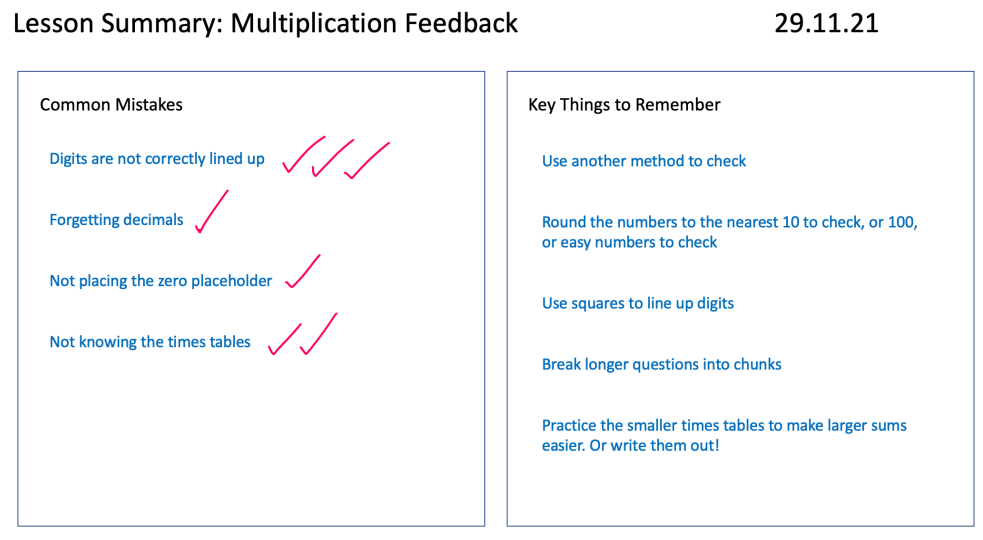
1. A positive
'you were really accurate with rounding'
'you even tried questions you weren't sure about'
'you showed excellent working out'

2. Something to work
'remember to read the question carefully'
'try to have more confidence and have a go at all questions'
'use your book examples to help you'

End of lesson activity

At the end of the lesson, we decided to use group feedback to make sure the group knew that mistakes were common and how to address these. We wanted to normalise failure especially when students are trying difficult work.

All students contributed to misconceptions/mistakes and things to remember. The lesson gave students the knowledge about what these were but our aim in summarising was to be help bring the group together. These questions would then feed into the starter in the next intervention session.



Lesson Summary: Multiplication Feedback 29.11.21

Common Mistakes

- Digits are not correctly lined up ✓✓✓
- Forgetting decimals ✓
- Not placing the zero placeholder ✓
- Not knowing the times tables ✓✓

Key Things to Remember

- Use another method to check
- Round the numbers to the nearest 10 to check, or 100, or easy numbers to check
- Use squares to line up digits
- Break longer questions into chunks
- Practice the smaller times tables to make larger sums easier. Or write them out!

Appendix L: Conversations and Reflections Notes

Monthly Recorded Collaboration Catch Ups: Researcher and Astrid

1. **September 2021: Collaborator (Astrid) and Researcher (AAG)**

Purpose: initial meet to discuss year 2 MSc study findings and this coming year.

AAG asked Astrid what she thought about students settling back into school after summer holidays, after COVID breaks, and what changes she has seen in her time 4 years at the school.

Astrid commented that students seem to lack the ability to concentrate. There is increasingly low-level disruption in classrooms and that unstructured (out of lesson) time, such as moving in corridors, is a peak time for poor conduct e.g. fighting, shouting, running.

Astrid comments that the behaviour and level of engagement has seemed to slip over the last 4 years. This is seen in the low-level incidents and in written work where many students leave work incomplete and give up quickly if activities require effort. Astrid thinks that students opt-out more easily now than a few years ago; that the culture of the school was not as learning and development focused as previously.

AAG shares the findings of the year 2 projects with Astrid: students shared that they have a fear of failure, and data (limited) showed older students tended to experience fear of failure to a greater extent than younger students. Students had previously commented that they were worried about making mistakes in front of other students and that feeling this way meant they would often choose not to contribute to lessons.

2. **October 2021: Astrid and AAG**

Purpose: Catch-up Meeting- AAG shares the plan for interventions and the rationale for the study

Astrid asks to observe a lesson first and then complete a session herself, running the questionnaires having seen a group with AAG.

We discuss the different approaches to improve learning behaviours and reduce fear of failure/anxiety. Small groups in themselves may be enough and show some changes in attitude. But would this be sustained beyond the small groups? What is at the root of students' beliefs and attitudes that means they feel more comfortable in a small group? How can we work on that and then develop strategies to improve self-efficacy and self-regulation that extend into more situations beyond the intervention classroom?

We agree we want discussion and paired work to be a large part of the intervention. To avoid students just reading out answers during periods of collaboration, and to promote more discussion we decide to have pairs share working out before they know the answer.

Students will be asked to debate their answers where they are different, find where solutions and thinking may differ and work out whose solution would be best/most effective.

3. **Dec 2022: Astrid and AAG**

Purpose: adjustments after pilot
Changes to questionnaires – easier language. Less space for an answer – less daunting. After conversation with Astrid, l suggest changes to the questionnaire that involve some reordering. Some students struggled to understand the questions without explanation. The length of space for some questions was difficult for students to process, leading to leaving the question out or answering with one word.

We decide to ensure our explanation allows time for questions from students. More time to discuss the research if students want

We feel that students need space to discuss maths worries that they are talking about in class, and to put these on paper. We decide to add a question about maths anxiety. But we want to know about other subjects too so add a question about other subjects. These are questions 1 and 2 in the questionnaire for cycle two.

4. **Jan 2022: Astrid and AAG**

Paired work has been working well. Students have been able to help each other with prompt sheets and ready-made solutions. Students have been positive during these times, more so year 7. Year 11 have demonstrated some awkwardness, less engaged body language and more inhibition compared to year 7 but still showing excellent focus and positive responses 1-1 with the teacher.

5. **February 2022: Astrid and AAG**

Purpose: Reflection on student answers – pilot study
One student could not participate in interview as planned due to fixed term exclusion.

Adjustment to student questionnaire:
In questionnaires, students often say they are not afraid of failure or experience no anxiety. They might behave in way contrary to this. Can I include an additional question to find out, if they aren't afraid of failing, why they might not answer a question in class?

6. **March 2022: Astrid and AAG**

Purpose: Reflect on cycle two

We feel cycle two students were very engaged from the beginning. We both felt more comfortable, even more so than with the first groups of students. Keeping students motivated, making sure the class is interesting, and trying to prevent students from feeling self-conscious in a small class is difficult but really enjoyable. Even students who had previously refused lessons or would walk out regularly stayed and made effortful contributions throughout.

Some of these students could probably do with more small group work but it's unlikely to be possible this year, as we try to reach as many students as possible.

Some students that really stand out are the very shy ones who have previously not spoken. Their comfort appears to have increased in these sessions but not outside in the corridors or in other lessons. Students who lacked confidence at first approach us both outside of class to say hello, which feels really important. There's something about belonging here. Like they've found a little bit of space that they know and feel ok in.

We're both really sad to be saying goodbye to the sessions with this second cycle. The students have been remarkable. It's an absolute privilege to get to work with people who have so much to offer.

Appendix M Conference Presentation Slides (Redacted)

[redacted] TRUST

CONFERENCE 2022

AMBITION FOR ALL • [redacted]

SESSION TITLE: Student Engagement

SESSION HOST: [redacted]

Question 1

About You

What are your personal motivations for working in a school setting?

Please answer in the chat bar

Session Structure

Please post thoughts or questions in the chat throughout

1. Introduction
2. Historical Motivational Theorists
3. Learning Constructs
4. Our Contexts: Ideas to Consider
5. Questions and Discussion

Introduction

1. Why the interest?
2. Challenges of research
3. Differences of perspective

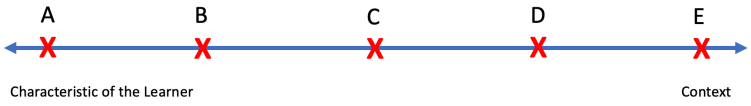
Question 2

About a Student

Think about a particular student who exhibits behaviour we associate with high motivation.

Where would you put them on the continuum in terms of what determines this motivation?
A, B, C, D, or E.

Please answer in the chat bar



Skinner | Behaviourist

Implications for teaching

Using extrinsic rewards and punishment would be enough to motivate students.
A problematic educational theory.

Atkinson | Achievement

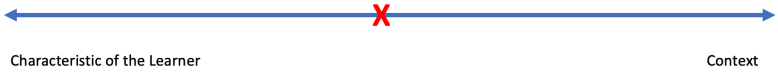
Implications for teaching

Reduce fear of failure to counter the demotivating impact of high anxiety

Dweck | Attribution

Implications for teaching

Focus on mastery on completion or competition



Mastery Goals or Performance Goals
Growth Mindset and Learned Helplessness

Question 3

About your Students

Do any particular theories resonate with you when you consider your students in general?

Please answer in the chat bar

Behaviourism	Achievement Theory	Attribution Theory
Reward and sanction	Fear of failure v Pride	Effort/Ability Fixed/Fluid

Learning Constructs

What are they?
What are the learning constructs or behaviours we seek to cultivate in students?
- Self-efficacy
- Self-regulation
- Metacognition

How do they look and work?
How do these learning constructs manifest, connect to each other and relate to barriers to learning?

How does it relate?
Learning constructs and motivation

Common Themes – A Study

Within Mrs. Rayburn's classroom, smartness operated as a *tool of social positioning*, authoritatively used to denote which students had social power. Those students framed as smart, such as Natalie, became the students most other students wanted to befriend. Natalie constantly negotiated demands from students to sit beside her at lunch, play with her at recess, or hold her hand, while students framed as "not" smart, such as Jackson, were excluded, not chased after, not sought out to sit beside at lunch, not asked to hold hands or included in games. Jackson played by himself at recess and never seemed to acquire a special "buddy" or friend in the classroom. Students' popularity—or lack of it—connected to teacher praise and public lessons of smartness around the stoplight, Shoe Tyer's Club, and Phone Number Club. One telling piece of information regarding teacher perceptions of Jackson and Natalie was seen when Mrs. Rayburn told me on the first day of school she knew Natalie would be her favorite student. On the other hand, she regularly complained Jackson "got on her nerves."

(Hatt, 2012; USA)

Please ask if you would like a longer extract.

Common Themes

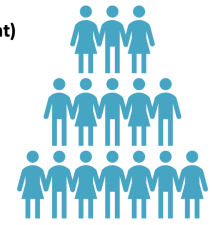
1. Engagement, motivation and self-beliefs are established in very **early years**.
- Hatt (2012) Longitudinal Study: *'Shoe Tie Club', traffic lighting privileges, and public shaming.*
- Drake, Belsky, Fearon (2014) n = 1,149 students

2. High anxiety, **fear of failure**, or fear of performing poorly in comparison to others, inhibits learning and healthy learning behaviours.
- OECD (2020) international study into fear of failure and self-efficacy
- Lau et al (2022) (see Short Read Slide) n = 1,175,515 students

Our Contexts

- XXX research findings 2019 – 2021

- **Belonging (and Parental Engagement)**
Basit (2013)
Willms (2003)
EC (2018)



- COVID Impact
Camacho et al (2021) - Portugal

- **Student Consultation**
Pedder and McIntyre (2006)
Arnot and McIntyre (2004)
Postlethwaite and Haggarty (2003)

Reading | Listening

Longs

Carole Dweck – Mindset the New Psychology of Success

Daniels, H. & Edwards, A., 2004. The Routledge Falmer reader in psychology of education, London ; New York: Routledge Falmer. (Chapter 5 for motivation)

Hargreaves, D.H., 1982. The challenge for the comprehensive school : culture, curriculum and community, London: Routledge & Kegan Paul.

Shorts

Dare to Lead podcast - Brene with Dr Angela Duckworth on grit and the importance of trying

The Evidence Based Education podcast (approx. 30 - 45 mins each and covers all sorts including learning dispositions)

Teacher Wellbeing podcast (slipped in here for help with motivation and looking after yourselves)

Claxton, G. 2009, "Cultivating positive learning dispositions", in Daniels, H., Lauder, H. & Porter, J., 2009. Educational theories, cultures and learning [electronic resource] : a critical perspective, London ; New York: Routledge. pp 177-187 (if this is hard to get hold of do email me and I'll see if I'm permitted to send sections across).

https://www.theguardian.com/education/2022/feb/07/teachers-and-too-much-homework-contribute-to-maths-anxiety-study