Metacognition and Macbeth: Using Lessons from Cognitive Science to Teach Shakespeare in Schools.

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Abstract

Research into metacognition and the positive impact it may have on academic attainment has shown promising results (Dignath et al., 2008; Motteram et al., 2016; Perry et al., 2018). Studies have also indicated that one of the main factors affecting students' understanding of metacognition is teacher understanding of metacognition (Branigan & Donaldson, 2020; Ozturk, 2018; Wall & Hall, 2016). Despite this, metacognition is often either oversimplified or considered too complex to define. This thesis reviews the theoretical and empirical literature and presents a Metacognitive Task Completion Process (MTCP) model designed and put forward by the researcher to demonstrate how the metacognitive process may relate to self-regulation, self-efficacy and academic anxiety when an academic task is undertaken.

Study 1 reports an investigation into the impact of teaching a combined metacognitive and knowledge-based approach had on a cohort of Year 9 students studying GCSE *Macbeth*. Participants were randomly allocated at class-level to either the control group (knowledge-only based approach) or the experimental group (combined approach). The results indicated that students exposed to the combined approach showed higher levels of academic attainment, accuracy for memorising quotations and self-efficacy than students exposed to the knowledge-only based approach. However, the experimental group did not show reduced levels of academic anxiety following the intervention compared to the control group.

Study 2 sought to investigate teachers' understanding of metacognition and use of metacognition in their teaching practice. Participants completed an online questionnaire and results demonstrated that teachers understanding of metacognition differed on the basis of participation in relevant CPD, but not on basis of teaching experience, subjects taught, Key Stages taught, or geographical region. The results also found that participants' understanding of metacognition significantly predicted their use of self-efficacy and metacognitive practice in teaching.

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Declaration by Author

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for a degree or other qualification at this university or elsewhere. All sources are acknowledged references.

Chapter 1

Context for Study

> It is at least conceivable that the ideas currently brewing in this area could someday be parlayed into a method of teaching children (and adults) to make wise and thoughtful life decisions as well as to comprehend and learn better in formal educational settings.
>
> (J. H. Flavell, 1979, p. 910).

1.1 Defining metacognition

John Flavell's pioneering research into cognitive monitoring and metacognition and their potential value in helping students learn and understand more efficiently (Flavell, 1979) sparked an avalanche of studies into how these concepts could be used to boost academic outcomes. Although Flavell's initial research categorised metacognition as four-part model (comprising of: metacognitive knowledge, metacognitive experiences, goals, and actions) a definitive definition of metacognition remains contentious and the concepts that underpin it are often perceived as too complex or nebulous to pin down (Akturk & Sahin, 2011; Dinsmore et al., 2008; Quigley et al., 2018). This may be why the term metacognition is often oversimplified as "thinking about thinking." However, for educators wanting to find out more about metacognition and how it can be applied in the classroom, this definition is problematic. Partly, this is because it is too vague and does not explain what the learner should be thinking about, or how they should direct their thinking. It also assumes that just being cognisant of the thinking process is sufficient; however, this is not the case. More helpfully, and accurately, metacognition can be viewed as a cognitive procedure that focuses learners on planning, monitoring and evaluating their approach to an academic task, or learning process (Quigley et al., 2018).

Metacognition is not an inherent skill or competency; instead, it is a process that can be explicitly taught to students (and teachers) to use in their learning (Quigley et al., 2018). Studies into the impact of metacognition on student attainment have shown promising results (Desoete & De Craene, 2019; Dignath et al., 2008; Motteram et al., 2016; Perry et al., 2018), creating a compelling argument for teachers to adopt a metacognitive approach in their classrooms. Given the potential benefits that adopting a metacognitive approach may offer, it is not surprising that educational leaders and teachers are seeking to develop their own theoretical understanding of the concept and how it could be effectively deployed in the classroom. This surge in interest has been met by increasing number of educational textbooks, blogs, webinars and professional development sessions specifically aimed at helping teachers implement metacognition in their classrooms. Once such resource is the Educational Endowment Fund's guidance for teachers on metacognition and self-regulated learning. The Educational Endowment Fund (EEF) is an autonomous national charity, which was created in 2011 to help bridge the attainment gap between the most and least affluent students in English schools. As part of its work, the EEF provides evidence-based resources to schools to help inform pedagogical practices, as well as funding trials testing different approaches to raising attainment. Since the EEF launched its first Teaching and Learning Toolkit in 2011, metacognition and self-regulated learning has been constantly placed as one of the most popular strands (Higgins et al., 2016) and by 2018 research on their website relating to metacognition had been accessed over 120 000 times (Quigley et al., 2018). Despite the surge in studies exploring the educational impact of adopting a metacognitive approach in the classroom, to date there remains relatively few applied studies that are conducted in authentic classrooms settings. That is, studies delivered in school classrooms, rather than laboratory settings, and delivered by fully-qualified teachers, rather than researchers. In their review of applied cognitive strategies Perry et al. (2021) stated that conducting research in authentic

classrooms settings can be difficult as it lacks the rigidly-controlled conditions afforded by a laboratory setting. However, teaching students effectively is a highly-skilled role that involves complex and frequent decision making, in order to adapt the needs of the lesson to their students. It seems logical, therefore, that to give teachers the best chance of understanding, replicating and applying metacognitive theory in their teaching, studies should also be conducted in an environment that authentically represents their classroom experiences. The student intervention written for Study 1 was conducted in a school setting and delivered by participating students' timetabled classroom teachers in order to make the educational context as authentic as possible.

1.2 Teacher understanding of metacognition

Although this surge of interest in metacognition shows no sign of abating, the complexity of metacognition as a concept coupled with increased pressure and workload on teachers (Higton et al., 2017; Walker et al., 2019; Wood, 2019) risks educators attempting to adopt this approach without fully understanding it. Furthermore, teachers not fully understanding or implementing the theoretical ideology underpinning metacognition may generate "lethal mutations" (Perry et al., 2021) in their classroom, where practice and theory become uncoupled from each other and an erroneous approach is adopted. The EEF's review of the evidence underpinning cognitive science in the classroom (Perry et al., 2021) cautioned against this uncoupling. It advised that care should be taken to ensure that teachers seeking to utilise cognitive science principles in lessons undertake a considered and informed approach, which takes into account the context of their students, setting and learning outcomes. Given the complexity of metacognitive theory, this considered and informed approach should also be adopted by teachers looking to utilise metacognition in their pedagogy so that it does not become oversimplified or misunderstood, leading to lethal mutations in the classroom.

Research also indicates that teacher understanding of metacognition plays a significant role in student understanding of metacognition (Branigan & Donaldson, 2020; McKendree & Washburn, 2021; Ozturk, 2018; Wilson & Bai, 2010). If this is the case, it seems logical that for teachers to be able to better teach students about the metacognitive process and how to apply it in their learning, they first need to have a clear understanding of metacognition and this is the first of seven recommendations in the EEF's guidance report to teachers on metacognition and self-regulated learning (Quigley et al., 2018). Despite this, there currently remains relatively little research into how much teachers in the United Kingdom know about metacognition and the factors that may influence it, such as targeted metacognition training and the length of time in service. Study 2 seeks to address this by investigating what teachers in the United Kingdom understand about metacognition and if this is associated with teaching experience or training in metacognition.

1.3 Student self-efficacy and academic anxiety

There is some evidence to suggest that learners' use of metacognitive strategies can mediate their self-efficacy (Cera et al., 2013; Hayat et al., 2020). Research indicates that high levels of self-efficacy, which is the belief that an individual has in their ability to complete a task successfully, can have a positive effect on student attainment (Aurah, 2013; Bandura et al., 1999a; Coutinho, 2008; Galyon et al., 2012). Research conducted by Bandura (2018) also theorised that individuals with higher levels of self-efficacy may experience lower levels of academic anxiety as they are more likely to perceive an assessment or test as a challenge that they can cope with and complete successfully. In contrast, a student with a lower level of self-efficacy may see a similar event as threatening, which can lead to increased anxiety as they do not think they will be able to complete the task successfully. Although some levels of academic stress may be considered a natural response to a high-stakes examination, and could even be

motivational in encouraging students to work towards a specific academic goal (Brown et al., 2022; Gregor, 2005; Ofqual, 2019a, 2019b), it can become harmful when students feel overwhelmed by anxiety and can, in some extreme instances, tragically lead to suicide (McLaughlin & Gunnell, 2020; NCISH, 2018; Rodway et al., 2020). Changes by the government to England's GCSE system in 2017 led to concerns that the new assessment system was putting increased pressure on students. A survey by the National Education Union (one of England's two main education trade unions) found that 89% of teachers surveyed (*n*=650) believed that these changes made more students extremely anxious and stressed than the legacy GCSE (NEU, 2018).

In this increasingly pressured environment of high-stakes examinations, it may be that there is some benefit in teaching students a metacognitive approach, not only as a way of helping increase academic attainment and self-efficacy, but also to help students reduce worry about academic assessments and high-stakes tests. While a degree of apprehension about examinations can be considered a natural response to a high-stakes, pressured academic situation and in some cases even a benefit, as it encourages students to focus on and work harder for an upcoming assessment, excessive levels of academic anxiety can be damaging. Excessive academic anxiety becomes an obstruction when it begins to interfere with students' capacity to concentrate, memorise information, or learn new concepts. This may lead to lesson and task avoidance and procrastination, which has the potential to spiral as students drop further behind their peers, thus becoming more anxious and repeating this cycle (Howard, 2020; Sarason et al., 1990). Tragically, in extreme cases, academic pressure has also been reported as a factor in suicides by children and young people (McLaughlin & Gunnell, 2020; NCISH, 2018; Rodway et al., 2020).

Studies into the use of physical and physiological methods to reduce academic anxiety have reported some benefits in adopting this approach (Ergene, 2003; Kumar & Singh, 2017;

Rentala et al., 2019; Topp, 1989). However, it may also be case that supporting students to prepare more effectively for how to tackle examinations could help reduce their test anxiety (Bradley et al., 2010; Dodeen, 2009; Howard, 2020). By teaching students a range of metacognitive and cognitive strategies and study skills (as well as the core disciplinary knowledge they need to complete the assessment) teachers would also be providing the tools learners need to give them a greater understanding and feeling of agency over how to tackle examinations effectively so they know how to revise as well as what to revise.

1.4 Cognitive and metacognitive strategies

As expert learners, teachers are well-placed to share not only their high-level subject knowledge but also the different cognitive and metacognitive strategies they would use when completing an assessment themselves. Cognitive strategies are the methods that students use to help them acquire new knowledge and undertake learning tasks, such as using mnemonics or dechunking to memorise spellings. In contrast, metacognitive strategies are those used to facilitate the metacognitive process, such as using self-questioning to reflect on how well new information is being learned and if the chosen cognitive strategy is working effectively. The EEF's Guidance Report on Metacognition and Self-regulated Learning (2018) recommended that teachers should teach both categories of strategy in the classroom so that students know how to learn effectively as well as what to learn. Furthermore, it advocated for teachers to explicitly demonstrate how to use these strategies by verbalising and explaining their own thinking when modelling how to approach a task. In doing so, they pass on their expertise as learners so that novice learners can better understand and develop how to use cognitive and metacognitive strategies in their own learning. In addition to helping students develop the characteristics of expert learners, this approach may help demystify the learning process so that learners experience increased levels of self-efficacy and reduced levels of anxiety as they know

exactly what they need to do to be successful in an academic task. The intervention written for Study 1 was designed to give teachers delivering the combined metacognitive and knowledge-based approach multiple opportunities to share their thought processes and expertise of how to tackle the tasks included within the unit. In comparison, teachers delivering the knowledge-only based approach used pre-written models that demonstrated what a successful response comprised of, but not how the response had been constructed.

1.5 GCSE English examinations

Changes to England's GCSE system meant that, from summer 2017, Year 11 students were examined on new curricula and awarded different GCSE grades. The new grading of 1-9 was designed to make it easier for employers and educational establishments to differentiate between students who had sat the legacy GCSE (with grades awarded from A* - G) and those sitting new, reformed GCSEs. Furthermore, an additional GCSE grade (grade 9) was added to identify students that had achieved an exceptional performance in their examination (a grade 8 was approximately the same grade as a legacy GCSE A* grade). Changes to the curriculum included an increased focus on terminal, closed-book examinations and a move away from other methods of assessment, such as controlled assessments or coursework. Consequently, students are required to memorise more information and sit more terminal examinations under the new system. For example, in the legacy GCSE English literature examination (pre-2017), students sat a two-hour terminal examination at the end of the course consisting of two, one-hour long papers that each comprised 35% of their final GCSE grades. They would have already completed the other 30% in controlled assessments undertaken over the two-year course. In comparison, a student sitting the 2023 English literature GCSE with the same examination board sits a two-hour examination (40% of final grade) plus an additional two-and-half-hour examination (60% of final grade). In addition to the increase in terminal

examination time, students are also required to memorise more information in closed-book conditions. Given the increased focus that the new GCSE places on memory, there is an increased need for students to develop metacognitive and cognitive strategies to help them memorise and recall more information across a wide range of curricula.

1.6 The impact of Covid-19

Since this study was originally designed, the global Covid-19 pandemic has had a profound effect on the educational community. In response to the rapid escalation of the novel coronavirus, the British government announced, on 18th March 2020, that all schools in England would close to all students on 20th March 2020 for face-to-face learning until further notice (apart from for vulnerable children and to those whose parents were key workers). Secondary schools, sixth form colleges and further education centres were requested to provide online face-to-face teaching, alongside distance learning, from 15th June 2020 for Years 10 and 12. The Department of Education (DoE) figures estimated that by 16th July 2020, 66% of secondary schools were open to at least one of these two year groups, and that approximately 68 000 (11%) of all Year 10 students had attended school on that date. Despite the fact that the vast majority of students in England were unable to access face-to-face classroom learning during the lockdown, teachers were still working to provide students with learning resources, with schools moving towards the use of online platforms, such as Google Classroom, Microsoft Teams and Purple Mash to facilitate this learning. During school closures, students were expected to engage in online learning as the main method of access to their education; however, a number of issues made this problematic for both educators and students, especially during the start of the lockdown when schools did have much time to prepare for this transfer following the government announcement of the first school closure in March 2020. Issues included both student and teachers' lack of familiarity and training with online platforms; limited student

access to appropriate technology, especially for those living in low-income households, and varied levels of parental support and ability to be able to help students engage in this form of learning.

The closure of schools during the pandemic affected both studies in this thesis, particularly Study 1. The original lessons written and created for Study 1 began running from the start of the spring term in January 2020; however, the study was terminated when schools were closed in March 2020 and (as only baseline assessment data had been collected at this point) it was not possible to generate any meaningful analysis to compare pre-, mid- and post-intervention data. Furthermore, the lessons were designed to take place in the classroom and assessments in high-control conditions, so it was not logistically possible to transfer them to be taught online, especially in the light of both students' and teachers' initial unfamiliarity with online teaching platforms at the start of the pandemic. The intervention was re-scheduled to be run with a different cohort in January 2021; however, the participating school closed at the start of this term (in line with government directives, due to the pandemic) with only one day's notice, so the study was postponed. The participating English department agreed to change the Year 9 curriculum plan for 2021 so that the intervention (based on the study of the GCSE text, *Macbeth*) could be run in the spring term of 2021. This intervention began in April 2021, with completion at the end of June 2021. However, a number of adaptations needed to be made to the intervention design to accommodate changes in the participating school's school timetabling and organisation (created to accommodate social distancing regulations) and loss of students' face-to-face learning. Details about the changes made to the original intervention can be found in Appendix A.

Data collection for Study 2 was also delayed as a result of the pandemic. Although the teacher questionnaire was originally scheduled be opened for responses from September 2020, the closure of schools meant that most teachers had not taught a full timetable of lessons in the

classroom for over 6 months. As the survey was asking teachers to reflect on their classroom practice, the opening of the survey was delayed until January 2021 to give teachers the chance to re-familiarise themselves with teaching in a classroom environment before asking them to participate in the survey. Despite the challenges that school closures brought to the two studies, they also presented a unique opportunity to refine the intervention for Study 1 and to add additional questions to the survey in Study 2. Details about the extra survey questions, exploring teachers' use of explicit modelling in both online and classroom scenarios, can be found in Chapter 5.

1.7 A research –practice perspective

There is an increasing impetus within the teaching profession for practitioners to engage in researching and implementing evidence-based strategies in the classroom. The Research Schools Network, which was established in 2016 with the aim of making evidence-based research accessible to educators, now has 33 research school hubs across England. Although their remit does not directly include conducting research, they support schools by offering advice on evaluating existing research evidence; delivering Continuous Professional Development (CPD); providing guidance on how to develop and improve teaching and learning, and helping apply for research grants. Since the creation of this network, over 11 000 schools have accessed support from their local Research School (Research Schools Network, 2023). This focus, together with work done by institutions such as the Educational Endowment Fund (EEF), is increasing the priority of research-based learning informing classroom pedagogy.

Unlike highly-controlled laboratory-based settings, school environments are complicated and diverse, influenced by different factors such as socio-economic, demographic, and locational contexts. It is, therefore, not surprising that research findings from highly-

controlled laboratory settings may not reliably be replicated authentic classroom settings (Perry et al., 2021). As an experienced English teacher, it was important for to me to ground my research in a school setting as a way of bridging the gap between metacognitive theory and practice, when conducting a study in an authentic context. Throughout the completion of this thesis, I continued to work part-time as an English classroom teacher, teaching secondary school students in a range of different year groups and prior academic attainment levels. Although, the dual teacher / researcher role could be considered a possible ethical issue in educational research (Roberts & Allen, 2015), no students taught by me (as the researcher) were included Study 1 (see Section 4.3 for participant information) to help maintain the fidelity of the research. However, despite this limitation, my 16 year's teaching experience and disciplinary knowledge of English Literature, proved valuable when I was designing and resourcing the *Macbeth* lessons created for Study 1 that could be delivered in an authentic school scenario.

In addition to investigating research in complex and diverse classroom contexts, the dual researcher-practitioner role can benefit teachers in developing their professional expertise (Mills, 2000). The growth in action research can support teachers to develop their understanding of different theoretical concepts, such as metacognition, and how they can be used to improve their teaching practice and benefit their students. In doing so, it can also empower them to investigate and find solutions to specific barriers their students may be experiencing in the classroom, such as creating effective opportunities for oracy or developing reading fluency. In addition to signposting how to conduct this research, organisations, such as the Research Schools Network, can also facilitate bringing together a network of teachers and schools with similar barriers / those who have developed strategies to overcome such barriers to explore and evaluate different approaches relevant to their context. Furthermore, in developing an intervention that was grounded both in theoretical understanding and classroom

practice, Study 1 presents a model that has been trialled in an authentic school setting and could potentially be used by other schools.

Chapter 2

Literature Review

2.1 Metacognition and self-regulated learning

2.1.1 Defining metacognition and self-regulated learning

"If you can look into the seeds of time, And say which grain will grow and which will not, Speak then to me" (Shakespeare, 2001)

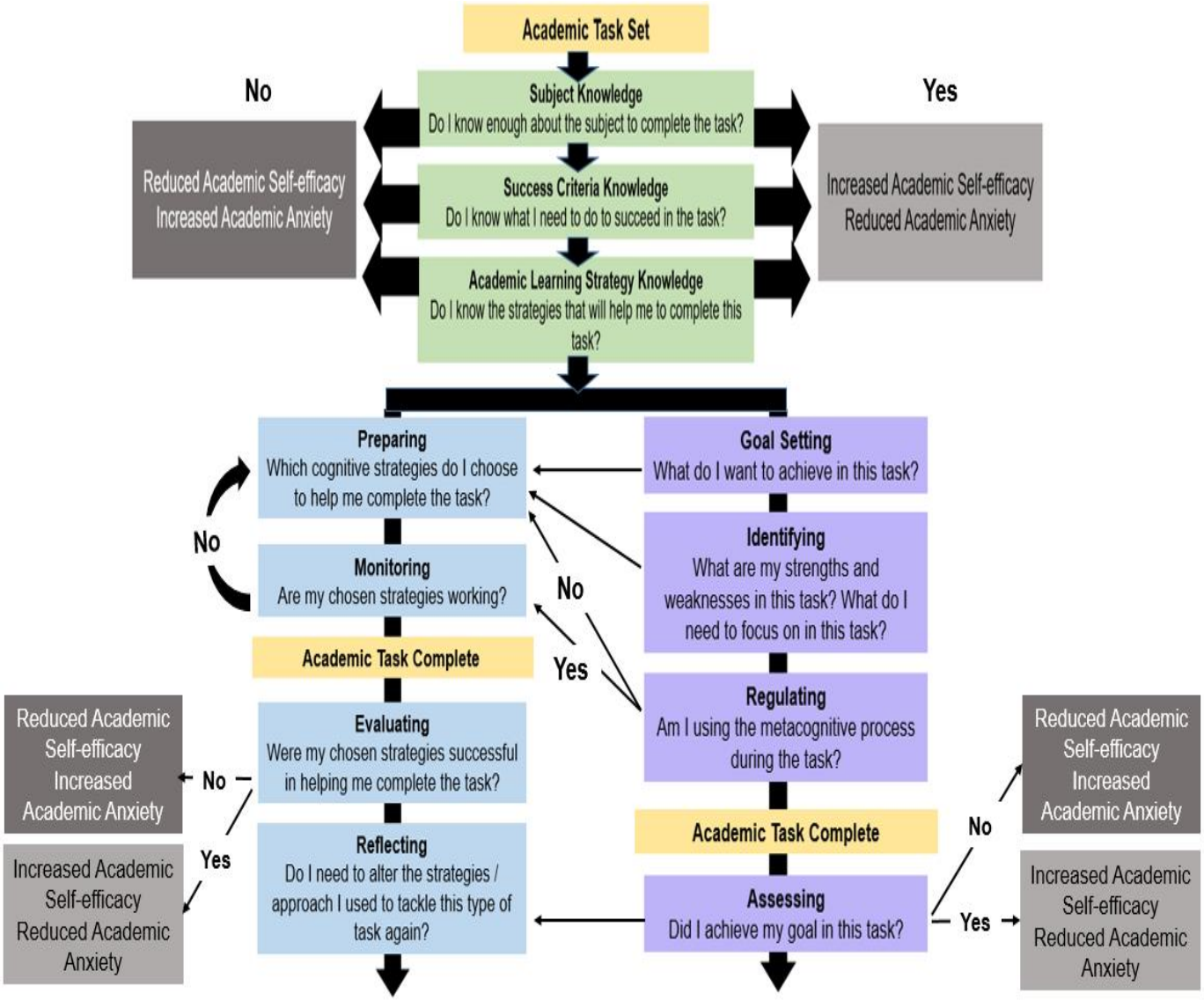
At the heart of all academic learning is cognition. Cognition is the cerebral process of knowing, or thinking, and involves different functions, such as searching, monitoring and rehearsing (Winne, 1985, 2011). The root of metacognition derives from the Latin word "cognoscere", which means getting to know. The suffix "–tion", which is generally applied to verb with a Latin root, denotes the action of the verb (in this case, thinking) and can mean condition or process of. This indicates that metacognition is something the individual actively engages in and is not a passive state. Furthermore, the prefix, meta-, derives its etymological root from the Ancient Greek language, with meanings that include, "after", "behind", "altered", "beyond" and "among". In the context of the term metacognition, the prefix, meta-, denotes "about;" thus, metacognition is frequently described in its simplest form as, thinking about thinking. However, although this definition intimates the reflective aspect of metacognitive thinking, insofar as it suggests metacognition involves awareness of, and reflection on thought processes, it is not specific enough in describing what an individual is thinking of when they are thinking about their thought processes.

This ambiguity has also made it difficult for researchers and theorists to reach an agreement on what metacognition is (Akturk & Sahin, 2011; Gascoine et al., 2022; Wellman, 1985). Although Wellman (1985) described metacognition as "thinking about thinking", he

also referred to it as a "fuzzy" concept, difficult to define. In their literature review on metacognition and its measurements (2011), Akturk and Sahin also argued that metacognition was a nebulous concept, which made it difficult to pin down to a simple definition. Furthermore, in their evaluation of their ReflectED study (Gascoine et al., 2022) the Educational Endowment Fund (EEF) posited that one of the challenges of actualising the theoretical benefits of metacognition in the classroom could be due to the difficulty in defining the term, which has also resulted in lack of consensus about what metacognition is. However, there are elements identified within the study of metacognition, which are helpful in pinning down a more specific definition of the term. An individual's awareness of their thought process appears central to the concept of metacognition (Hacker, 1998; Hennessey, 1999; Kuhn & Dean, 2004). This element was also identified in Flavell's early investigations into metacognition and metamemory, which defined metacognition as, "One's knowledge concerning one's own cognitive processes and products or anything related to them." (Flavell & Resnick, 1976, p. 232). More precisely, the term metacognition may be defined as a process, which involves recognising, understanding, monitoring and evaluating one's own thinking (Hacker, 1998). Throughout this process, the learner is not only aware of, but also controls their thinking, in order to complete a task (Hacker, 1998; Hacker et al., 2009; Moshman, 2018; Schraw & Dennison, 1994; Schraw & Moshman, 1995). Although fundamentally it appears to involve a learner's capacity to examine, control and evaluate their learning (Quigley et al., 2018), the term metacognition is also closely allied to, and in some cases used interchangeably with, the concept of self-regulated learning, which further adds to the complexity of creating a definitive definition of what metacognition is. Figure 2.1 shows the Metacognitive Task Completion Process Model developed and put forward by the researcher for this study to demonstrate how the metacognitive process may relate to self-regulation, self-efficacy and academic anxiety when tackling an academic task. Component parts of this model and how

they relate to the current literature will be presented and explained further in this literature review.

Figure 2.1 *Metacognitive Task Completion Process (MTCP) Model*



2.1.2. Background to metacognition and self-regulated learning

To further understand the intricate and nebulous qualities of metacognition, it may be helpful, to begin with Flavell's founding research into metacognition (1979), which developed the concepts of metacognition and cognitive monitoring based on his earlier research into memory and metamemory (Flavell et al., 1970; Flavell & Wellman, 1975; Flavell, 1971). In an article

in the late 1970s, Flavell hypothesised the potential value of using metacognition in an educational setting. In this paper, he proposed a four-part model for monitoring cognition; these were defined as: metacognitive knowledge; metacognitive experiences; goals, and actions (or strategies). Flavell contended that metacognitive knowledge involved the understanding that an individual has about the factors that affect cognitive outcome, such as knowing how they most effectively learn new knowledge, or the different ways it is possible to learn this knowledge. In contrast, metacognitive experiences centred around the beliefs and feelings the individual has about a cognitive process. For example, a metacognitive experience could involve a feeling of confusion when learning new information, or a belief that the individual has successfully understood a new piece of information. Flavell also theorised that the boundary between metacognitive knowledge and metacognitive experiences were not distinct and the two parts may bleed into one another, thus, a metacognitive experience could impact, or influence, the way an individual tries to learn new knowledge. However, if, as Flavell suggested, metacognitive experiences involve an individual's beliefs and feelings about undertaking a cognitive process, such as learning a list of 15 quotations off by heart, it may be that such experiences also encompass an individual's self-efficacy beliefs about how successful they will be in completing a task. Thus, a student whose metacognitive experience is that that they are unsuccessful at learning quotations off by heart may also have reduced self-efficacy beliefs about how successful they will be in being able to complete the task and learn all 15 quotations. Flavell further explained the distinction between cognitive strategies, which "make cognitive progress" (J. H. Flavell, 1979, p. 909), and metacognitive actions which monitor it, and theorised that these strategies also intersect in metacognitive knowledge so that both may be used to achieve a particular goal. However, a knowledge of cognitive strategies, will not help a learner make cognitive progress unless they also know how to select and apply

a cognitive strategy successfully to the task. In this context, it may be that Flavell's metacognitive actions refer to monitoring as a specific part of a larger metacognitive process.

Research by Kluwe (1982) theorised that metacognitive information processing needed both data and processes. This model was based on a classification defined by Ryle (1949), who stated that information processing systems contained both declarative and procedural knowledge, which could be distinguished from each other. Declarative knowledge is knowledge about facts and information, such as knowledge of the main events and characters in *Macbeth*. In comparison, procedural knowledge is knowledge about how to perform a task, such as knowing how to solve a problem, or how to learn 15 quotations about Lady Macbeth off by heart. Kluwe posited that the metacognitive knowledge examined in developmental psychology was related to the declarative knowledge stored in a system, such as information collected in the long-term memory. Kluwe related the metacognitive strategies defined by Flavell (1979) to procedural knowledge, such as that in the stored processes of a system. He also subdivided data (declarative knowledge) into two further categories: domain knowledge and cognitive knowledge. He defined domain knowledge as individual subject specific information, such as knowledge of the plot of *Macbeth*, whereas cognitive knowledge was described as an individual's theories and beliefs about thinking. The latter appears to be similar to Flavell's metacognitive experiences, insofar as they both relate to the learner's perceptions of their own cognition and learning beliefs. Kluwe also maintained that stored procedural knowledge comprised both solution processes and executive processes. His model outlined solution processes as focussing on solving a problem, while the function of executive processes was to monitor the choosing and application of the solution process, in addition to controlling the flow of solution activity and evaluating its success. The executive processes described by Kluwe do appear to link closely to the concept of metacognition as the process of recognising, understanding, monitoring and evaluating one's own thinking. However, in focussing solely

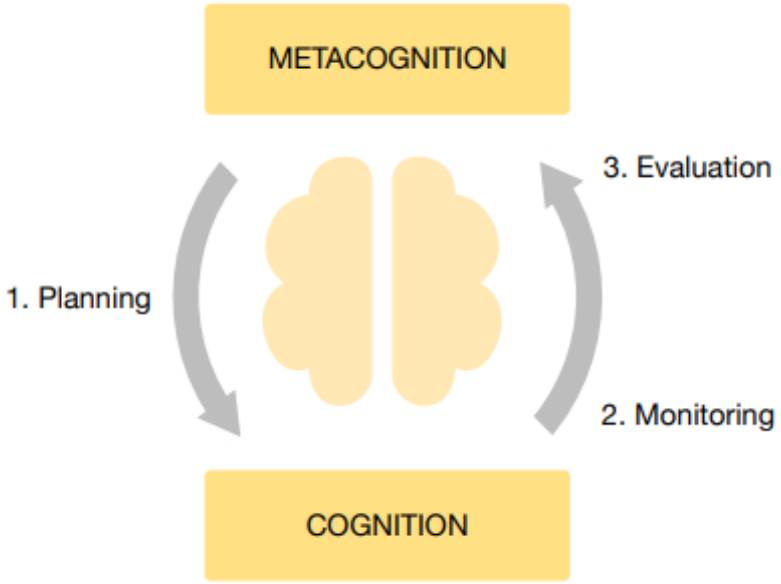
on solving a problem, and not considering on how to solve the problem, it is possible that solution processes relate more to self-regulated learning.

Self-regulation is broadly classified as the ability an individual has to control and adjust what they do, what they think and what they feel (Bakracevic Vukman & Licardo, 2010). Bandura and Wood's research into self-regulation (1989) referred to self-regulated learning as the ability to control, regulate and recognise one's own learning and to work consciously towards a specific goal by monitoring and adjusting the strategies being used to achieve the goal. In this context, the monitoring and adjusting of strategies, appears similar to Flavell's concept of metacognitive actions, which monitor the cognitive process and play a key role in monitoring understanding. Self-regulated learning is increasingly becoming synonymous with the concept of metacognition in education (Quigley et al., 2018); however, the link between metacognition and self-regulated learning, including where and if they overlap, remains indistinct. One reason for this may be the way in which the terms are sometimes used interchangeably with each other. Livingstone's synopsis of metacognition (2003), posited that the key problem with defining metacognition was the way that terms, such as self-regulation, were used interchangeably to describe metacognition. This appears to have been the case since Flavell's early research (J. H. Flavell, 1979), where he theorised that the self-regulatory quality of working towards a goal formed part of metacognitive functions, classifying goals as the aims of a cognitive activity and strategies as the thoughts and actions used to achieve these goals. In their meta-analysis of learning strategy instruction (2014), Donker et al. found that the terms metacognition and self-regulation were occasionally used interchangeably in studies. They theorised that this may be because self-regulation involved the control of cognition, which incorporates both cognitive strategies and metacognition. They defined metacognition as referring solely to knowledge concerned with cognition, in contrast to self-regulation which they considered encompassed both knowledge and control of cognition and motivation.

Further complexities can be perceived in the way that self-regulation has sometimes been classified within the larger umbrella term of metacognition. In their 2018 literature review of the effectiveness of teaching metacognition in schools in 51 studies, Perry et. al. deliberately included self-regulated learning (in addition to Learning to Learn and Thinking Skills) within the term metacognition. They theorised that this inclusion enabled the review to encompass studies that fell within the range of what they deemed to be a metacognitive strategy, which they broadly defined as a focus on how to learn (procedural knowledge) rather than a focus on subject specific (domain) knowledge. In contrast, the Education Endowment Foundation's latest guidance report on metacognition (2018) classified metacognition as one of three constituent parts of self-regulated learning, the other two being cognition and motivation. Cognition is defined as the cerebral process of understanding, or knowing or learning information, metacognition as the method used by a learner to examine and control their learning and motivation as a learner's commitment to employ both metacognitive and cognitive skills. The report states that each strand works in relation to the others and also includes strategies related to the strand, such as cognitive and motivational strategies. Furthermore, it posits that it is not possible for a student to be metacognitive (that is to monitor and control their learning) without having a range of cognitive strategies in their armoury, or the motivation and tenacity to utilise the strategies when undertaking a task. The guidance suggests that learners possess metacognitive knowledge about themselves as a learner (similar to the metacognitive knowledge and experience parts of Flavell's model), knowledge about different learning strategies (classified in Flavell's model as cognitive strategies), and knowledge of the task. At the start of a task, learners begin with these three types of knowledge and then apply and adapt them to complete the task. In the initial part of this process, students plan how to approach the task. As they work towards completing the task, they check progress by monitoring their chosen strategies and at the end of the task they evaluate how well they have

accomplished the task. The EEF model of model of the metacognitive process, shown in Figure 2.2, is a continual cycle, which students apply as the work though the task. As they do so, they also refresh their understanding of their three different types of metacognitive knowledge, subject knowledge and skills.

Figure 2. 2 *The EEF Metacognitive Process Cycle (Quigley et al., 2018)*

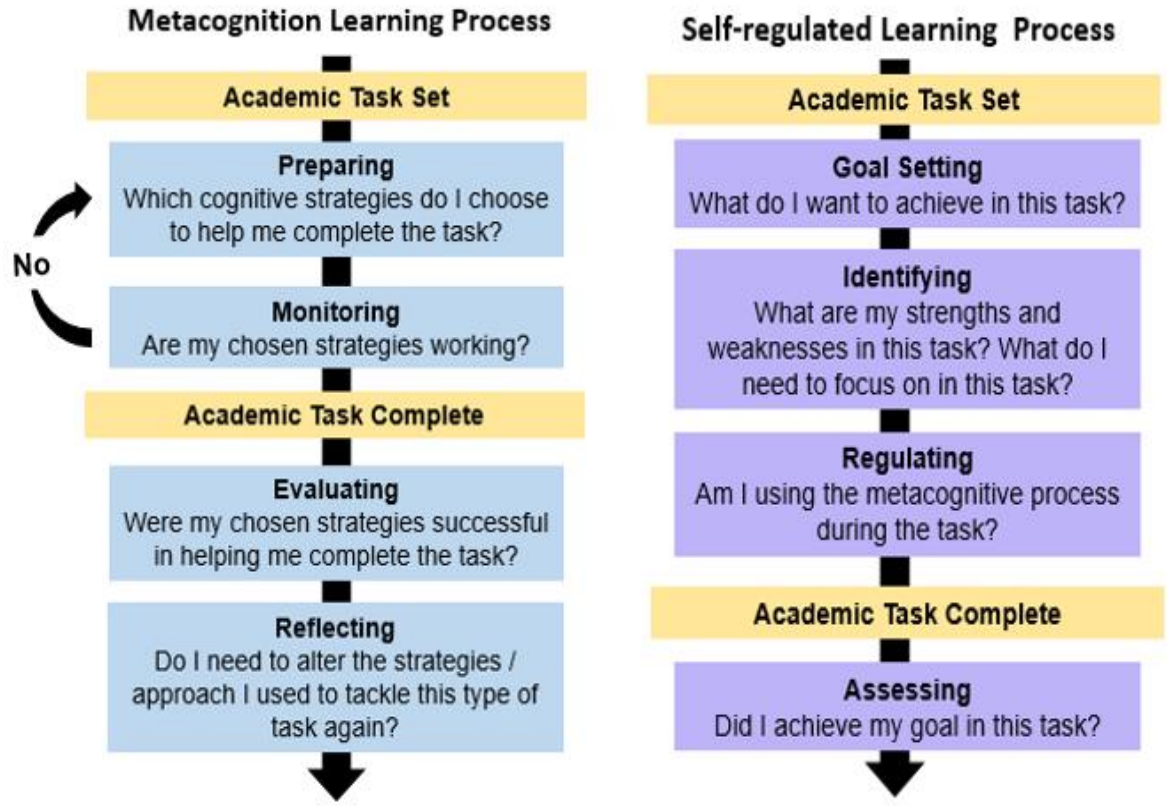


Although this metacognitive cycle recognises both that metacognition is a process, and the symbiotic relationship between metacognition and self-regulated learning, the elements defined as metacognitive knowledge can also be related to the self-knowledge aspects of self-regulated learning, blurring the boundary between the two and how they relate to each other. To achieve more clarity, it may be helpful to consider both metacognition and self-regulated learning as processes, which are used interdependently as a model for learning, as proposed in Figure 2.3, demonstrating the possible relationship between the two concepts. Figure 2.3 is a component part of the Metacognitive Task Completion Process model and shows the different

stages that occur in the metacognitive and self-regulation processes, as put forward by the researcher.

The ability to control and regulate learning appears to form an integral relationship with metacognition because both are active and continuous process, which rely on students' understanding of how to learn, and on knowledge of the cognitive strategies that will help them achieve their goal. Furthermore, self-regulated learners understand their strengths and weaknesses, and are able to accurately evaluate and reflect on how successful they have been in achieving their targets. Zimmerman (2002) perceived self-regulation as the process of an individual choosing a particular strategy tailored to meet the need of a specific learning target, rather than an individual characteristic the student either does or does not possess. This suggests self-regulation may be a process that can be taught to students in addition to subject specific knowledge. Schunk (1996) classified self-regulated learners as students who possessed the ability to observe, judge and react to themselves as learners, with the quality of self-judgement referring to an individual's ability to equate their current performance with their goal, to work out if they are progressing towards that goal. Therefore, it appears that metacognition can be classified as a cognitive process, whereas self-regulated learning encompasses non-cognitive traits such as motivation to work towards a goal and a separate entity to metacognition. The different stages in these two processes, put forward in the model developed by the researcher for this study, are presented in Figure 2.3.

Figure 2. 3 *Metacognition and Self-regulation Process Models (component parts of the MTCP model)*



In the Metacognition Learning Process part of the model, the metacognitive process commences as soon as the learner is about to begin an academic task, such as learning 15 quotations about Lady Macbeth by heart. Firstly, the learner begins preparing by selecting which, of all the cognitive strategies they know, they consider will be the most effective in helping them complete the task successfully. For example, skim reading through the text to identify and annotate key quotations that they can include to support their ideas would be a useful cognitive strategy to use when preparing to write an analytical paragraph. However, it would not be particularly useful for planning a piece of narrative writing, where applying a framework, such as story mountain, or narrative arc structure, would be more beneficial. Once the learner has begun using the strategy, or strategies, to help them complete the task, they should monitor if their chosen strategy is working. At this point, if the strategy is working they

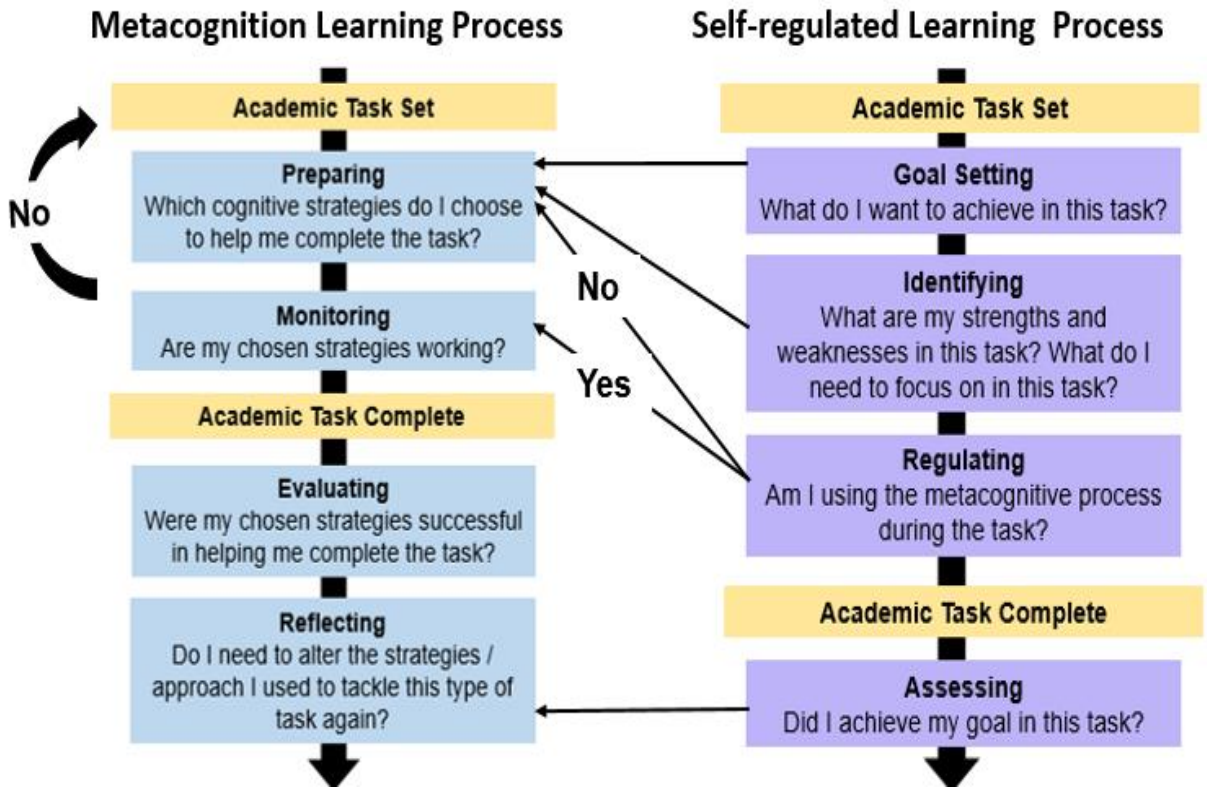
can continue with the task; however, if it is not working, or is inadequate on its own, the student should choose another strategy to help them. For example, they may not understand all of the original Shakespearean text, so cannot identify all the quotations that will help them answer the question and, therefore, they decide to review their class notes and use a dictionary to help them. The metacognitive process should not end when the task is complete. At this point, the learner should evaluate their original objective to identify what was accomplished and how successful they were in completing it. Although some definitions of metacognition, such as that posited by Hacker (1998), include evaluation within the process they do not include reflection. Yet, for students to be fully metacognitive, they also need to analyse their learning experience by reflecting on what they need to change and what they need to continue to do in order to build on their knowledge of how they learn and refine their practices accordingly to achieve greater success. During the preparation stage, a learner might ask themselves, "How do / will I tackle this task?" When monitoring they may reflect on, "How am I tackling this task and are my chosen strategies working?" Evaluating involves the student asking themselves, "How successfully did I complete this task?" Finally, during the reflection stage, they will consider, "How will I tackle a similar task next time based on what I have learned from completing this task?"

In the Self-regulated Learning Process model developed by the researcher (shown in Figure 2.3) students begin by identifying the goal(s) they want to achieve in the task, such as learning 15 quotations by heart; achieving their target grade when writing an analytical paragraph, or analysing layers of meaning within a text. Next, they should identify their strengths and weaknesses and what they specifically need to focus on when completing the task. For example, a weakness may be a tendency to leave trying to learn all 15 quotations until the night before the task is due, as the information is less likely to be embedded in the long term memory, or easily retrieved during the next day's test. To complete the task more

successfully, a more promising approach would be to use cognitive retrieval strategies, such as spaced learning, to help them memorise and recall the quotations more successfully in their test. The next stage would be students regulating their actions, behaviour and environment to help them complete the task. For instance, they may create a quiet study space and turn off their mobile phone to minimise distractions or use time management techniques, such as the Pomodoro method, to help them concentrate and maintain motivation using breaks as rewards for focused periods of study. The final stage in this process would be for the learner to assess how successful they were in achieving their original goal. It may be that if the goal was achieved that could motivate the student to employ successful cognitive and regulation strategies in similar tasks.

It is possible that the concepts of metacognition and self-regulated learning can be perceived as so closely interwoven because the motivational aspect of self-regulated learning facilitates students to progress academically as it helps them become engaged in striving towards a goal. It appears that motivational aspect of self-regulation can be of value in helping learners progress as, although they may be able to work through aspects of the metacognitive process, they may not benefit from them if they have no drive or desire to meet their goals and consequently give up or do not put enough effort into the regulating the task to complete it to their best ability. Figure 2.4 shows the association between the metacognitive learning process and the self-regulated learning process, as part of the MTCP model developed by the researcher by this study.

Figure 2.4 *Metacognition and Self-regulation Association Model (a component part of the MTCP model)*



This relationship demonstrates the impact that goal setting can have on helping students complete an academic task. Although both the academic processes of metacognition and self-regulation each have separate stages that are distinct from one another, they are also mutual processes, which assist the student in completing the academic task successfully. Goals are individual to a learner and may vary in terms of both ambition and motivation. Even if a number of an individual's goals have some features in common, such as achieving a Grade 5 across all their curriculum subjects in their GCSE examinations, the strategies used in the metacognitive process will differ according to the requirements of the specific academic task. Goals do not have to be grade specific. For example, a goal may be to complete a task within a time-limit; to analyse textual quotations in more detail; to refer more specifically to the examination

question, or to use more academic language. Furthermore, the goals may not be self-actuated, but feedback targets set by the teacher that can help the student make progress.

Studies into student motivation suggest it plays an important role in instigating student effort (Brookhart et al., 2006; Corno, 1993; Dweck, 2000; Dweck & Leggett, 1988; Salomon, 1983, 1984) and thus the determination they have to succeed in an academic task and begin the metacognitive learning process. To date, the focus of research into metacognition and self-regulated learning in England, has been conducted in primary schools (Branigan & Donaldson, 2020; Dignath et al., 2008; Gascoine et al., 2022; Motteram et al., 2016; Palantis et al., 2018). In their literature review on the effectiveness of primary school self-regulation interventions conducted in classroom settings , which included metacognitive thinking and metacognitive strategies, Dignath et. al. (2008) concluded that there was no significant disparity between interventions based on student age apart from strategy use and motivation. The age of students included in the review ranged from 6-11 years old, and it was noted that studies involving younger students, within this age range, had larger effect sizes than those involving older students in these two areas. Although this suggests that younger learners profit more from being taught metacognitive strategies than older primary school students, the findings also demonstrate that age was not a factor in the effect of the interventions on the academic attainment of students. Instead, Dignath et al. (2008) proposed that increased benefits to younger learners were observed because they were more open to learning new strategies, whereas older students may be more fixed in their approach and less willing to attempt new methods of learning. Research into mindsets by Dweck and colleagues (Blackwell et al., 2007; Blackwell, 2002; Diener & Dweck, 1980; Dweck, 2000, 2006) has classified learners into entity (fixed mindset) and incremental (growth mindset) categories and suggested that student motivation and effort may be influenced by their mindset. Dweck contended that individuals with a fixed mindset considered intelligence and ability to be static, while those with growth

mindsets perceived these traits as malleable and alterable by effort and adaptive learning. Using this classification, it would appear that students with a growth mindset are more likely to adopt both metacognitive and self-regulated learning approaches as they will view mistakes as opportunities to review and adopt new strategies, helping them ameliorate their learning processes. Research by Yan et. al. (2014) concluded that, to some extent, incremental learners manage their learning more productively than entity learners and are more intrinsically motivated, which is noteworthy as some studies suggest that intrinsic motivation is a desirable quality that may predict academic achievement (Gutman & Schoon, 2013).

2.2 Metacognition and academic attainment

Building on Flavell's research into memory, metamemory, and metacognition strategies in the 1970s (Flavell & Wellman, 1975; Flavell, 1971; J. H. Flavell, 1979), there have been a number of investigations into whether teaching students metacognitive approaches can improve their academic achievement (Braund & DeLuca, 2018; Desoete & De Craene, 2019; Gascoine et al., 2022; Hacker et al., 2009; Jones et al., 2020; Livingston, 2003; Motteram et al., 2016; Özsoy et al., 2017; Perry et al., 2018; Veenman et al., 2006; Wang et al., 2021). The Educational Endowment Foundation (EEF) have produced a Teaching and Learning Toolkit, which aims to condense academic research to make it more accessible to teachers and school leaders in order to help them choose interventions that will best support student outcomes. The toolkit currently rates 30 different strands (such as Mastery teaching, peer tutoring and learning styles) against three criteria: cost to implement; how robust the available evidence is and how many additional months of progress students made compared to similar students who did not participate in the intervention. In the Teaching and Learning Toolkit (2018), the EEF cited metacognition as having a significant impact on student attainment and had funded 20 metacognition and self-regulated learning-based studies. The July 2021 update of the metacognition and self-

regulation strand reviewed 246 studies and, of all 30 strands listed, it was rated as having the highest impact on student progress. On average, secondary students made an additional seven months of progress over the course of a year, while primary students made eight months of additional progress. Although evidence strength was rated as secure in this strand (it scored four out of five padlocks), one padlock was lost as a sizable percentage of the interventions were not evaluated independently, a limitation that is also true of this study presented in this thesis. The EEF also noted that the implementation of metacognition can be problematic in practice as it requires students to become more accountable for their learning and to increase their understanding of what they need to do to succeed. A review of the available literature on the effects of teaching metacognition in English schools was also conducted by Perry et al. (2018) and concluded that there was robust evidence that teaching metacognition effectively could have a positive impact on learner outcomes. Perry et. al. concluded that, taking into account the EEF's three criteria, metacognition was the most effective of the strategies the EEF reported on in the Teaching and Learning Toolkit.

A 2016 efficacy trial funded by the EEF demonstrated mixed findings in its evaluation of ReflectED, a programme designed by Rosendale Primary School, London, UK, to help develop primary school pupils' metacognitive thinking (Motteram et al., 2016). The project, a class-level randomised control trial, involved 1858 Year 5 pupils (aged 9-10) from 24 participating UK schools. It is comprised of the delivery of a 28-week programme of half-hour lessons, which taught pupils how to employ a range of metacognitive strategies in order to regulate and evaluate their own learning. Pupils used *Evernote* (a computer programme) to record and review their progress in lessons throughout the intervention, and their teachers were able access their notes in order to find out the work that students considered challenging and the strategies used by the students to help them overcome these difficulties. At the start of the academic year, participating teachers received a pack of supporting resource materials and

lesson plans for them to follow, and took part in an initial day-long training session and subsequent three half-day sessions throughout the trial.

The study found that pupils who took in the ReflectED programme made an additional four months' progress in mathematics, compared to students in the control group. However, although this demonstrates a promising outcome for mathematics, two months' less progress than control group peers was made in the secondary outcome of reading, suggesting that the programme may have been detrimental to pupil progress in this area. Ostensibly, this could be due to students' use of metacognitive thinking and strategies creating greater impact when implemented in the subject areas of mathematics and science as some research suggests (Perry et al., 2018). Another possibility for students in the experimental group making less progress than their peers in the control group may have been that, in order to complete and fit in the metacognitive intervention for the study, less time was spent on reading and developing reading skills to accommodate the successful completion of the ReflectED programme, to the detriment of some pupils' progress in these areas. Some teachers in the study reported that they struggled with fitting the extra half-hour lesson in with restraints such as the time needed to adhere to the curriculum, and other school activities. The study recorded that nearly all treatment schools reported being at least one or two lessons behind at some point in the intervention and had either discarded an entire lesson, or combined and reduced two lessons into one. It also noted that sometimes other curriculum lessons had to be dropped instead in order to complete the intervention lessons. Although the Rosendale mentors did not consider this to be a substantial problem, it could suggest that such interventions can have a negative impact on some areas of student learning if it impinges on their ability to complete the curriculum in other core subject areas. Study 1 seeks to address this possibility by designing an intervention in a way that ensures there is sufficient time for all groups to complete the programme, without compromising their learning in other areas. Furthermore, the focus on a single academic subject

in a secondary school setting where student timetables allocate specific time allocations to each subject each week, and the focus on an English Literature GCSE component set text, ensured the that intervention would not have a pejorative effect on student's learning in their other academic subjects, or on completion of the Year 9 English literature curriculum in the school used in the trial.

Guidance from the EEF (Quigley et al., 2018) suggested that metacognition should not be taught as a discrete subject, separate from subject knowledge, and that metacognition could be used much more extensively to benefit a wide range of subjects areas. Although some of the cognitive strategies used by students in different subject areas may differ, as different curricula have different knowledge bases, success criteria and models of assessment, many cognitive strategies could be used across subject disciplines. For example, retrieval strategies (such as spaced learning and frequent low-stakes quizzing) can used by students to remember and recall information in assessments, no matter what the curriculum content. Furthermore, in order to adopt a more extensive approach, which can be used across multiple subjects, there also needs to be a clearer lexical framework that is shared and understood by both students and teachers, as also proposed in the Metacognition Task Completion Process model developed by the researcher and shown in Figure 2.1, where the questions under each of the process parts of the model could be used to develop a cross-curricular framework for students to use. For example, during the preparation phase, students could consider which cognitive strategies to choose to help them complete the task successfully. The tasks and strategies may differ both within and across subjects, yet the process involved in selection does not. Once students have selected their chosen strategy, they can universally move along the process to monitoring the success of their chosen strategies, irrespective of the subject knowledge being used.

Although the metacognitive process is not subject specific and can potentially be used across different subject disciplines, this does not negate the requirement for students to know

subject specific information. As the MTCP model (Figure 2.1) suggests, an understanding of subject knowledge is also a vital requirement for any student applying the metacognitive process to their learning, and research suggests that students' use of metacognition may be context specific (Hadwin & Oshige, 2011; Kim et al., 2013). In their evidence review of metacognition and self-regulated learning, Muijs and Bokhove (2020) posited that the transfer of metacognition between different curriculum areas is not an automatic process and that use of metacognition and self-regulated learning is greater when students have a deeper understanding in subject specific domain knowledge. However, the EEF's latest evaluation of cognitive science approaches in the classroom (Perry et al., 2021) found that the majority of the applied cognitive studies (studies taking place in authentic classroom environments) were mainly in mathematics and science. Study 1 seeks to develop this evidence base by this investigating the effect of adopting a metacognitive approach with secondary students in a literacy-based subject, where the evidence base is less robust. Furthermore, the study has been designed as a domain specific approach, based on the study of *Macbeth* in English literature lessons, to investigate if the metacognitive process can be adapted for use in a specialised curriculum area.

2.3 Teacher understanding of metacognition

In order for teachers to be able to explicitly model and direct students towards the metacognitive process they first need to have a clear understanding of what metacognition is, and how to use it effectively in the classroom. Teachers' understanding of metacognition also plays a vital role in helping students understand metacognition and develop a metacognitive approach in their learning. It is, therefore, not surprising that research in this field indicates that one of the primary factors, which affects student understanding of metacognition, is teacher understanding of metacognition (Branigan & Donaldson, 2020; Calderhead, 1987; Ozturk,

2018; Perry et al., 2018; Wall & Hall, 2016; Wilson & Bai, 2010). Developing knowledge about how to foster student metacognition (to be able to support their students' understanding and application of metacognition) was the first recommendation listed in the EEF Guidance Report on Metacognition and Self-Regulated Learning (2018). Although this EEF report aimed to delineate the research on metacognition into an accessible guide for educators with clear and practical suggestions to use in the classroom, it also acknowledged that due to the complexity of metacognition it was hard to give definitive examples of what metacognitive understanding and skills were. It further concluded that teachers' misconceptions and lack of knowledge about metacognition could be a factor in metacognitive interventions in schools not reaching their full potential. For example, the EEF's ReflectED efficacy trial (2016) theorised that the lack of data about teachers' prior knowledge of metacognition made measuring academic achievement post-intervention problematic. This was because many teachers were already using a range of strategies in the classroom, which were associated with metacognition, such as evaluating the positive aspects of students' work using What Went Well (WWW) and areas for improvement with Even Better If (EBI). A feedback process using both WWW and EBI may be perceived as a strategy from the evaluation part of the metacognitive process, which signposts students to consider, "Were the cognitive strategies I used successful in helping me complete the task?" It could also be perceived as incorporating part of the reflection process of, "Do I need to change these cognitive strategies to successfully complete this part of the task?" For What Went Well and Even Better If to be a metacognitive approach used by students, learners should be able to apply this feedback when self-assessing their work, rather than the teacher providing feedback. This does not mean that WWW and EBI have no merit metacognitively if used by a teacher to assess academic progress and identify goals. Instead, the teacher could model students how to use What Went Well and Even Better If through their own marking, as a way

of teaching students how to reflect and evaluate on their own progress, and gradually reduce this support to develop independent metacognitive thinking.

The complexity of understanding and applying a metacognitive approach in the classroom was also posited as one of the possible reasons for the lack of progress made by students in the latest ReflectED trial. Following the efficacy trial, an extended ReflectED randomised controlled trial (RCT) was run between February 2018 and July 2019 with 112 participating schools (Gascoine et al., 2022). However, despite other studies into metacognition (including the ReflectED efficacy trial) suggesting promising results in increasing student attainment, generally students receiving the intervention made no additional progress compared to those not receiving the intervention. On average, intervention students made zero additional months of progress in reading and one month's less progress in mathematics than those in control groups. In secondary outcomes (relating to grammar, punctuation and spelling), students receiving the ReflectED intervention made an additional one month's additional progress compared to those in control groups. The evaluation report hypothesised that the lack of student progress in primary outcomes may be in part impacted by both the difficulties in establishing a theoretical consensus in how to define metacognition, as a complex concept, and the challenges of translating this complexity into classroom practice. Despite this, teacher post-intervention surveys and interviews revealed that some teachers delivering the ReflectED intervention reported that they had seen an increase in students' understanding and use of metacognitive vocabulary over the course of the trial. These teachers noted that, as a result of participating in the intervention, students were more able to articulate their learning and explain when they found learning difficult. The study also investigated teachers' attitudes and awareness of metacognition pre- and post-intervention. Participant responses in pre-randomisation surveys found that 82% of control group teachers and 75% of intervention teachers either "agreed strongly", or "somewhat agreed" that metacognition was an important

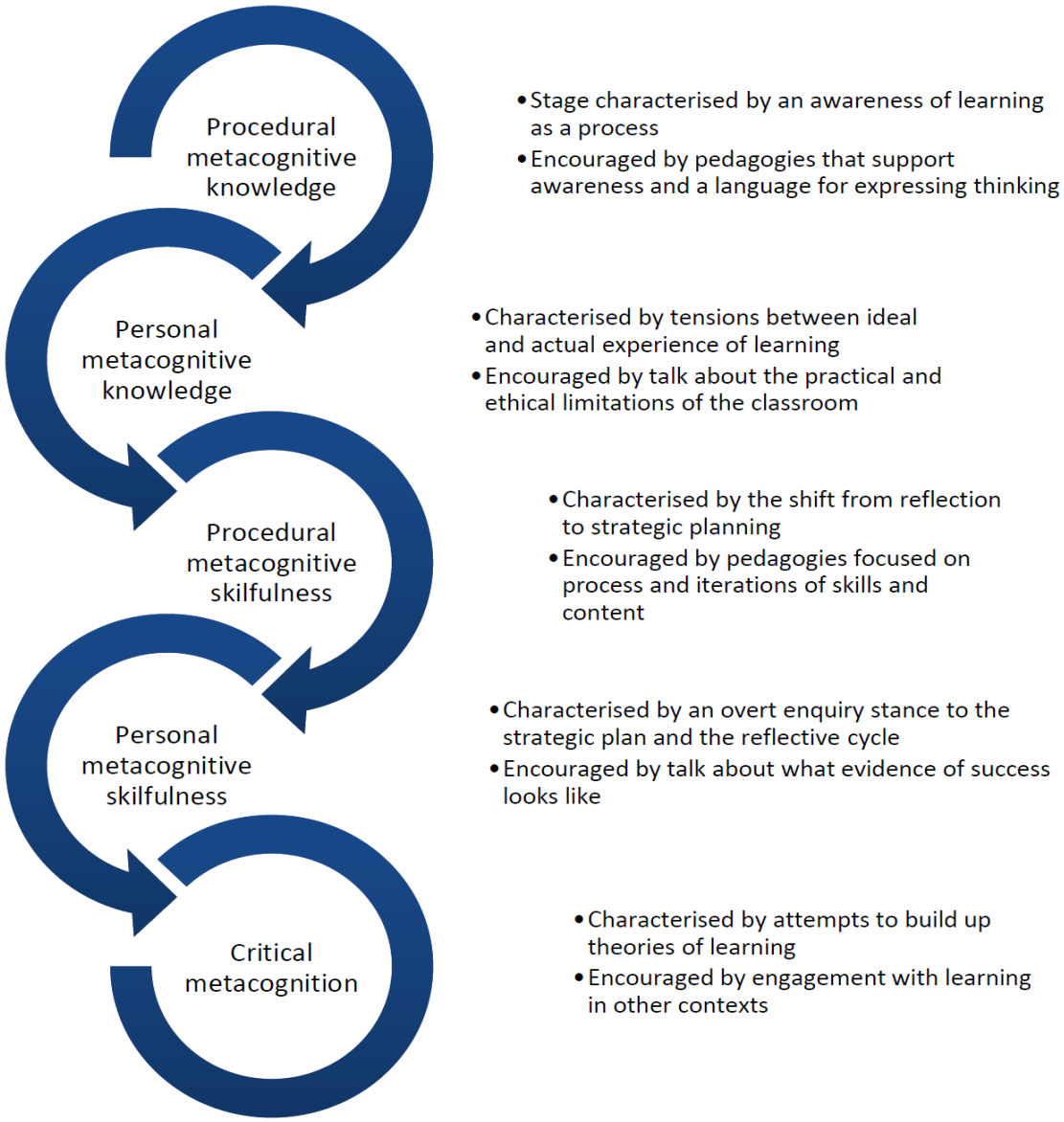
concept in their classroom and teaching. This belief was strengthened, post-intervention, to 94% of teachers in the intervention group; however, it declined to 68% in control group teachers, perhaps demonstrating that, despite the lack of progress made by students, the intervention increased teacher understanding of how metacognition could be applied in the classroom. A thematic analysis conducted using participant responses found two dichotomous strands in relation to teacher understanding of metacognition. Some teachers stated that metacognition was new to them and they had either had no formal training in it, or were unsure how to define metacognition or what metacognitive practice looked like in the classroom. In contrast, other teachers offered accurate definitions of the term and could identify specific strategies used in their classrooms and their schools to develop this approach. Overall, 96% (*n*= 169) of teachers, nominated leads and headteachers the intervention schools agreed that the ReflectED had increased their own awareness of metacognition.

A study by Wilson and Bai (2010) investigated American teachers' understanding of metacognition, theorising that teachers needed to have a clear understanding of metacognition in order to know how to teach students about metacognitive processes. Two strands of the study investigated the relationship between participants' understanding of metacognition and their view of the strategies that helped students become metacognitive, and the strategies teachers regarded as most effective when teaching their students to become metacognitive. The results indicated that teachers with a better comprehension of metacognition recorded that in order to teach their learners to be metacognitive they needed an intricate understanding of both the theory of metacognition and metacognitive strategies. However, the study size of 105 graduate students working towards a Master's Degree in Education, could be considered problematic, as it represented only a small sample of teachers in America. Furthermore, it would not be unreasonable to assume that, as they were all studying towards a Master's Degree in Education, they may have had a greater understanding of metacognitive concepts than classroom teachers

not undertaking this post-graduate course. The study did recognise that it had expected participants to have some prior understanding of metacognition as they were working towards advanced degrees. Despite the finding that many participants had a high understanding of metacognition, Wilson and Bai also noted that this understanding did not necessarily cascade down into their teaching, but this could not be examined as the study did not ask for participants to state what they did in the classroom. Instead, participants rated strategies used to develop metacognitive thinking in learners.

In their paper researching the use of metacognitive role models, Wall and Hall (2016) examined the effect of using Learning to Learn (L2L) across a range of over 60 primary, secondary, special schools, and included two further education colleges. Learning to Learn can be seen as a metacognitive approach as it centres on the processes involved in learning, and methods of helping students become more effective learners and evaluators of their own learning. Wall and Hall viewed teachers as playing a pivotal role in helping students develop their own metacognitive learning. Through their analysis of case studies, observations and interviews, Wall and Hall, detected “patterns” which arose from the project. From this, they constructed a model which demonstrated the five different stages of metacognitive engagement they observed in the study.

Figure 2.5 *Stages of Metacognitive Engagement (Wall & Hall, 2016)*



Stage 1 of this model involved determining metacognitive knowledge by developing a common linguistic vocabulary that allowed teachers and students to discuss metacognition effectively. Part of this stage also involved fostering an environment where students felt comfortable with uncertainty so that they could debate different learning experiences and how learning occurred. Creating this environment also appears to relate Bjork's concept of establishing the correct level of challenge by promoting challenge in learning. These optimal points of learning have been defined as "desirable difficulties" (Bjork, 1994) and refer to demanding cognitive strategies that require a greater effort, but result in increased long-term

memory retention. During the second stage, both teachers and students began to work out their own areas of difficulty in learning and explore them in more detail. This was followed by a stage where individual perspectives were shared as a group, with a shift from, "How *did* I learn?" to, "How *could* I learn?" As part of this process, teachers shared their own challenges in learning and were honest with students when there was something they did not know or understand. The penultimate stage involved learners reviewing the learning strategies they had used and revisiting earlier experiences where there had been a tension between choice of strategy set against the limitations of the environment, such as time. This stage also concerned the development of students into co-researchers with other students, working more independently from the teacher and driving the focus in their own learning. Finally, Wall and Hall observed a critical metacognitive stage where there was a shift from practice focused learning to more theoretical considerations, such as, "What does a good learner do?" It also marked a change in questioning from how individuals had learned to why they learned, and from what they had discovered about a certain subject to what they had discovered about themselves and the way they learned. Teacher understanding of metacognition and how to foster a metacognitive approach in the classroom is a key aspect of Wall and Hall's Stages of Metacognitive Engagement, demonstrating how the teacher needs to use their own understanding of metacognition to become involved in, support, and develop students' metacognitive methodology in the classroom. Some of the stages in Wall and Hall's model can related to parts of the metacognitive process, such as reflection; however, it also appears to encompass some aspects of self-regulated learning, such as Stage 3, which involves individuals identifying their strengths and weaknesses in learning. As previously identified, determining the boundary between metacognition and self-regulation is not a simple process, and there remains much academic debate about whether metacognition encompasses, or is distinct from, self-regulation. In this respect, the boundary between the two concepts can be perceived as just

as nebulous and difficult as definitively defining the concept of metacognition. The Metacognition and Self-regulated Learning Association Process models, as shown in Figure 2.3 and created for the current study proposes that although there is a symbiotic relationship between academic metacognition and self-regulated learning, they are distinct from each other as separate processes.

The role that teachers play in helping students articulate and develop their thought processes was explored in a study by Branigan and Donaldson (2020), investigating how Structured Thinking Activities (STAs) supported students to think metacognitively. Structured Thinking Activities are designed to help students reflect on their own thinking and include resources, such as learning journals and logs. The study tracked a class of primary pupils as they were introduced to STAs and monitored the way they were used throughout the academic year. Although participating students generally appeared unenthusiastic about engaging with their learning journals and metacognitive thinking recorded in journals was often superficial, Branigan and Donaldson theorised that this may because the pupils (aged between 7-8) had not begun to learn metacognitive language. Despite this, they observed that the class teacher conducting the intervention was able to support students in their metacognitive thinking by modelling examples for students and explicitly explaining their thought processes. They concluded that while teachers should offer students opportunities to consider and regulate their own thinking, the explicit modelling of how to do this by teachers was fundamental in facilitating students to be able to do this in their own learning. If this is the case, it suggests that verbalised teacher modelling is most effective in helping students develop their own metacognitive thinking when teachers are also able to think in this way. Consequently, it appears vital that teachers not only have a theoretical understanding of metacognition, if they wish to adopt a metacognitive approach in the classroom, they also require clear guidance of how to apply metacognition in their own practice.

Despite this, at the time of this current study, there was little research conducted on the impact of targeted metacognitive training or extended professional development on teacher metacognition. Research by Ozturk (2017) investigated teacher's metacognition and competencies in teaching metacognition before and after they had participated in a professional development module in metacognition. All participants (*n*=30) were English language instructors at a University in Turkey and the intervention consisted of a one-day training session on teaching for metacognition. Pre- and post-intervention measures of teacher metacognitive awareness showed no statistically significant difference, which Ozturk theorised could be because one day of training was not sufficient for teachers to develop a deep understanding of metacognition, or how to apply it effectively in the classroom. Given the potential impact teacher understanding of metacognition can have on teaching students to develop their metacognitive skills, more research into the impact of targeted professional development in this area would be of benefit. Study 2 seeks to develop research into this field by investigating if the amount of teacher training opportunities in metacognition are associated with higher levels of teacher understanding of metacognition.

2.4 Academic Anxiety

2.4.1 Academic examination anxiety

Stress and anxiety are inter-related; however, they are not the same. Stress is the reaction to a perceived threat from an external cause, such as a high-stakes examination, and generally diminishes after the cause has ended or been resolved, whereas anxiety is a response to stress and may continue after the cause has ended. Stress is a condition that affects both the body and the mind and can create an inter-reaction between the two. Responses to stress vary among individuals and can be physiological or psychological, such as: headaches; increased blood pressure and pulse rate; loss of appetite; decreased concentration, and a lack of interest in other

things (McEwen, 2006). The mind both decides what is stressful and controls the body's physiological and psychological reactions. As a reaction to stress, anxiety is typified by feelings of hopelessness and fear, which can also cause psychological and physical symptoms, including: reduced concentration and ability to sleep; restlessness; nausea, and headaches. Although stress can sometimes be beneficial in an academic environment, such as when motivating a student to complete a task to a deadline, pressures such as high-stakes testing place students in stressful situations, which can cause negative effects that do not end when the stressful situation (such as a high-stakes examination) have passed. A study by Leibert and Morris (1967) categorised the effects of examination anxiety into two different responses, "cognitive" and "autonomic". Cognitive responses were classified as involving mental activity, such as worry and negative thoughts. These thoughts could include fear of failure or concern about what others will think of them if they perform badly in the test. Autonomic responses were defined as physical, and involve reactions in the autonomic nervous system, such as increased heart rate, and feelings of nausea. Research by Speilberger into anxiety in the 1960s categorised two different forms of anxiety: trait anxiety, and state anxiety (Spielberger, 1966). Trait anxiety was typified as a long-term, frequent response that was based on an individual's personality and psychology. In contrast, state anxiety was defined as a short-term, intense reaction to a specific situation, such as a high-stakes examination. This research also suggested that if an individual experiences high-trait anxiety, then their reactions to state anxiety are likely to occur more often and be more extreme than those experienced by an individual with low-trait anxiety. Therefore, it is possible that students with high-trait anxiety feel more extreme examination anxiety when confronted with test situations, which in turn could have a detrimental effect on their academic performance. If this is the case, then there may be a benefit to students completing a measure, such as the State-Trait Anxiety Inventory for Children (STAIC) (Spielberger & Edwards, 1973) to help identify students that are more prone to trait

anxiety. Results could be used to help mitigate examination anxiety with interventions and support as learners progress towards higher stakes tests and assessments, such as mock exams, in class assessments and GCSEs.

Although a degree of worry by learners about academic examinations could be considered a fairly typical and even natural response to a stressful situation, it becomes an obstruction when it begins to interfere with students' capacity to concentrate, memorise information, or learn new concepts. Research suggests that worrying about academic examinations and deadlines for assessed school work are the main causes of anxiety in secondary school students (Kouzma & Kennedy, 2004; Kyriacou & Butcher, 1993; Owen-Yeates, 2005). A study by Putwain and Daly (2014) found that 16.4% of GCSE students (*n*=2435) self-reported feeling high levels of examination anxiety, with over double the amount of female students (22.5%) recording text anxiety than their male peers (10.3%). A blog published by Ofqual (the regulating body in England for all tests, assessments, and examinations) on understanding text anxiety (2019a) suggested that if 600 000 students on average sit their GCSEs a year, that means approximately 100 000 students may experience high levels of examination anxiety each year. In addition to causing negative psychological and physical symptoms, excessive worry about tests may cause students to change their behaviour in order to avoid the situation. Such behaviours could include school and lesson truancy, task and revision procrastination, and avoiding high-stakes examinations. Although these avoidance behaviours may feel like a viable solution in the short-term, increased truancy and procrastination mean that students are dropping further behind their peers, which makes it increasingly difficult for them to catch up, and may add to their sense of hopelessness and despair – thus, perpetuating this behavioural cycle and impeding future career choices and progression (Howard, 2020; Sarason et al., 1990). However, the most significant and troubling outcome of examination anxiety is its association with suicide. A 2018 report by the National

Confidential Inquiry into Suicide and Homicide by People with Mental Illness reported that between the years 2014 – 2016 there were a total of 595 suicides by children and young people (under the age of 20) recorded in the United Kingdom, an average of 198 per year. In 2016 the total number of suicides recorded in the UK was 5965. Information about the cause of suicide in children and young people was requested for all cases and at least one cause was identified for 544 (91%) of cases. If an entry was not recorded in any of the data sources then it was considered to be absent or not relevant for the proposes of the study. Examples of such entries included abuse, bullying, neglect and family bereavement. Family bereavement was recorded as a factor in 134 (25%) of suicides in this age group, with emotional, physical or sexual abuse documented in 50 (9%). The most significant factor detailed, in this report, of the causes of suicide among children and young adults was academic pressure. Overall academic pressure was deemed a factor in 174 (32%) of suicides, with 27% recorded as having current examinations, impending examinations, or examination results at the time of death. The study also demonstrated that suicides increased significantly in the late teenage years; these are also the years when most UK students are studying for high-stakes national examinations.

2.4.2 Academic anxiety and GCSE examinations

Despite the potential negative impact examination anxiety on student well-being, there has been a significant increase in the number of high-stakes examinations taken by secondary school students in England. The introduction of England's new GCSE exam system, in 2017, by the British government raised concerns about the possible effect that such changes may have on student mental health and wellbeing. The new system was heralded by newspaper headlines in which school leaders warned about the increased levels of examination anxiety and stress that students would experience due to an increase in the length, volume and difficulty of the revised grade 9-1 examinations. The new GCSE syllabuses meant that students were sitting

more examinations (partly due to the new criteria removing the coursework or controlled assessment elements in many subject areas) which lasted for longer and were more academically challenging. Taking into account the increased time spent undertaking high-stakes examinations in other curriculum areas, and the increased reliance on memory skills, it is possible that this change will have a pejorative impact on students by increasing their examination anxiety. Data from the National Education Union's 2018 survey, showed that 89% of polled teachers considered the new system had significantly increased academic anxiety in students, while 78% reported that they considered the new GCSEs to have significantly increased levels of challenge. Qualitative data from this survey revealed that some teachers considered this to be a result of the increased content level and difficulty of the new GCSE (NEU, 2018). For example, one participant described a, "Huge increase in pressure to succeed, increase in workload and revision for students, feeling of inferiority due to more difficult content, constant feeling of failure." Other concerns also centred around the new structure meaning that more curriculum content had to be memorised, "A lot more anxiety and stress with more GCSE exams and everything being a memory test." Some teachers also expressed concerns that the move away from modules that included coursework as part of the assessment process to 100% terminal examinations also added to student pressure, "Pressure now on one final exam compared to previously when coursework was counted as part of the final grade." For some students taught by these teachers the pressure was overwhelming, with one teacher revealing that two of their students had attempted suicide.

Although school accountability to the government and stakeholders (such as parents and school governors) can be perceived as beneficial in helping monitor and maintain standards, it is possible that recent increases in accountability in England are also putting increased pressures on both educators and students. The introduction of school league tables has ensured that school results are transparent and available to parents; however, pressure to

perform well in league tables and inspections from the Office for Standards in Education, Child Services and Skills (Ofsted) may also be transferred from school leadership teams and teachers onto students as consequence of attempting to drive up academic achievement. Burnout and stress can cause emotional contagion from teachers to students (Burgess et al., 2018; Oberle & Schonert-Reichl, 2016), increasing worry about schoolwork and examinations. A report commissioned by the National Union of Teachers (NUT) in 2015, reviewed the impact of such accountability measures on children and young people (Hutchings, 2015). The report found that in order to improve test scores, there was a tendency among teachers and educational establishments to focus much more on testing, as that was how the performance of schools were measured. This often resulted in a narrowing of the curriculum to include more focus on the core curriculum, generally at the cost or loss of art-based subjects, such as drama, music and art. Moreover, students perceived that the purpose of going to school was to gain qualifications, rather than develop learning skills or a wide knowledge base. This could lead to an increased pressure on students to perform well in exams, if they judge it to be the main measure of their academic worth. Schools routinely offer after-school, weekend and holiday revision session to Year 11 students to help them excel academically and cram in as much revision as possible before the examination season begins. This can place some students in danger of burn-out, increased anxiety, and emotional and physical exhaustion as they strive to perform in this highly-pressured environment. Contagion of examination anxiety and burnout from their peers can also cause an increase in self-reported worry among students (Bonaccio & Reeve, 2010). This can be exacerbated by learners sharing anxieties, or comparing themselves less favourably to other students in terms of preparation, revision completed, or academic ability.

In 2016, the Organisation for Economic Cooperation and Development (OECD) published its tri-annual report into student attainment (Peña-López, 2016). The OECD tested

15-year old students from across the world using their Programme for International Student Assessment (PISA) in reading, mathematics and science to calculate how competent students were in the core subjects. In addition, PISA also tested student wellbeing, and focused on areas such as academic anxiety, engagement and motivation to achieve. The published report (based on data harvested in 2015) surveyed circa 540,000 students from 72 different countries. It found that 72% of UK students reported high levels of pre-test anxiety, even when they considered themselves to be well prepared (OECD average: 55%), while 52% were very tense when they studied (OECD average: 37 %). This report suggested that GCSE students from the UK generally experienced a higher level of anxiety than the international average of those surveyed by PISA. PISA's latest survey (March 2018) was published in December 2019. Although its findings on wellbeing for UK students, who were studying for the new GCSEs at the time of the survey, could have been indicative of whether the recent assessment changes have impacted on learners' examination anxiety, it uses different measures of student well-being so it is not possible to compare results directly. Students from the United Kingdom self-rated high levels of self-efficacy in some areas, with an average of 90% (OECD average 90%) responding with "agree or strongly agree" to the item, "I usually manage one way or another."; however only 59% of UK students agreed or strongly agreed to the item, "My belief in myself gets me through hard times." compared to the OECD average of 72%. Furthermore, a majority of UK participants also reported a fear of failure with 66 % (OECD average 56%) reporting that they "agreed" or "strongly agreed" that, "When I am failing, I worry what others think about me" and 70 % answering the same to "When I am failing this makes me doubt my plans for the future." (OECD average 54%). These results appear to suggest that, on average, students from the United Kingdom experience anxiety as they worry about their future and about the way they believe themselves to be perceived by others. With increased pressure placed upon secondary students in England to achieve in an increasingly competitive academic and

economic environment, in addition to pressure placed upon them by their families, peers, teachers and also themselves to succeed it is little wonder that the system is creating a society where so many students fear for their future.

2.4.3 Examination anxiety and the Covid-19 pandemic

Across the globe, student wellbeing and mental health was negatively impacted by the effects of the Covid-19 pandemic on both the mental and physical health of the world-population (Baloran, 2020; Liyanage et al., 2021; Mahfud & Gumantan, 2020; Pragholapati, 2020). During the initial stages of the pandemic, many countries legislated and enforced whole-scale population lockdown as the primary method of virus containment, until effective vaccines could be widely produced and distributed, leading to increased societal anxiety and isolation (Lakhan et al., 2020; Peteet, 2020). School closures played a significant role in virus containment (Stage et al., 2021), with the first school closures taking place in Britain in March 2020. One of the most immediate consequences of the closures on student examinations was a ruling by the British government that students in England would not sit their GCSE or A Level examinations in 2020 (the government subsequently ruled in January 2021 that GCSE and A Levels students would not sit formal final examinations in 2021 either). When schools in the United Kingdom initially closed, in March 2020, most students in the Year 11 and 13 cohorts had been studying towards final examinations and were within two to three months of completing their qualifications. As a consequence of the shift towards 100% high stakes, end-of-course examinations, there appeared to be no robust system in place to accurately calculate student examination grades. Following a consultation with stakeholders, the Office of Qualifications and Examinations Regulations (Ofqual) assigned GCSE student grades based on ranked teacher grading, school performance and students' prior attainment. A report by the Children's Commissioner of England (2020) found that 41% of respondents, aged 8-17,

(*n*=2000) were worried about schoolwork or exams. When asked to choose one of ten different categories they felt most worried about, at the start of the pandemic, including not being able to see family and friends (49%) and worrying about family and friends (33%), 22% of children chose exams. This was rated joint fifth, with four out of the 10 categories related to anxiety about education. Qualitative data from the report also showed that students who had been due to sit final GCSE and A Level examinations experienced higher levels of anxiety due to the perceived lack of agency it created. One 15 year old student writing about the award of her GCSE grades felt worried, "that I could not take my GCSEs and that my results have been taken out of my hands. It feels like a violation and that I am not in control of my destiny." (Children's Commissioner, 2020, p.15). Another 16 year old stated, "What has made me feel stressed was my GCSE results and how I feel like the grades will be unfair. I would have liked to sit them." (Children's Commissioner, 2020, p.16). This may be because those students who had studied hard to develop subject knowledge and have a stronger sense of self-efficacy no longer had an opportunity to prove their academic worth. Furthermore, students who performed badly in mock examinations, which may have informed teacher grading given to examination boards, may well have performed better in their final GCSEs due to increased revision, teacher feedback about how to improve from mock examinations and students not applying full effort into mock examinations as they view them as a practice rather than the real thing. Thus, assessing students in this way removed the opportunity for them to demonstrate progression in the GCSE examinations that they expected to sit in May / June 2020.

Although the removal of final examinations could, paradoxically, also result in a reduction in academic anxiety because students no longer have to sit a highly pressured, high-stakes test, this may also be dependent upon the situation of the individual students. As part of a qualitative study, which investigated students' attitudes to the cancellation of examinations due to the pandemic, McCarthy (2022) categorised participants' responses (*n*=4) into three

themes. These were: delight, disappointment and disillusionment. Although two students' delight that they did not have to sit examinations suggested decreased levels of anxiety, this may be because both students were content with receiving results based on a combination of their predicted grades and results from mock examinations. However, rather than feeling dissatisfied because they could not "take control of their own destiny", two students in this study felt disappointed by the abrupt removal of a goal that had given their school work a sense of purpose. The cancellation of examinations was perceived as "anti-climactic" and participants expressed disillusionment in the time and effort they had invested in learning facts for their GCSEs and A Levels. Because they were not going to be able to use some of this information in their assessments, they questioned the value in learning information (such as quadratic equations) at all as they did not think they would ever use it in everyday life. McCarthy theorised that the cancellation of examinations led to participants' increased awareness and criticism of the way that examinations shaped their educational experiences. As well as an opportunity for future study, the culture-shift in examinations necessitated by the Covid-19 pandemic could provide an opportunity for the government to review an academic system that places a significant degree of pressure on students through final high-stakes examinations as the primary measurement of learners' academic progress.

2.4.4 Reducing examination anxiety

There is evidence that , in some cases, a small to moderate amount of examination stress can be beneficial to academic performance (Sarason, 1980, 1984). However, it is also possible that if a student does not have any fear of failure (possibly because they have become disengaged from education, they are over-confident, or because there is no consequence to a poor outcome) than they will not dedicate sufficient effort into preparing for, or performing in the examination (McDonald, 2001). A study of 103 Portuguese undergraduate students by

Strack and Esteves (2015) investigated the possible benefits of students perceiving anxiety as a positive emotion, which could help them to view their exams as a challenge rather than a stressor. During the study, students self-rated feelings of academic anxiety, emotional exhaustion and whether they viewed anxiety as a facilitator in their exams for the 10 days prior to their examinations. Strack and Esteves found that if students viewed examination anxiety as a facilitator then they were less likely to experience emotional exhaustion. Although they did not report reduced anxiety, as a result of seeing it as a positive emotion, the study did report that students who perceived anxiety as a facilitator, also perceived the stressor as a challenge, rather than a threat. However, although they theorised that a reduction in academic anxiety may simply mean students thinking about anxiety in a different way, the study did not investigate how students may be able to do this. This is a significant issue as high levels of academic anxiety are associated with reduced examination performance as well as impacting negatively on student well-being. (Huberty, 2009). A small-scale study (Yadav & Pandey, 2020) investigated the effect of test anxiety on examination performance among 60 second-year undergraduate students in India. The results indicated that there was a statistically significant difference between students with high and medium test anxiety in terms of academic performance, and between students with low and medium test anxiety. They also recorded that learners with medium levels of examination anxiety performed best in academic tests (this was measured by the percentage result students achieved in their final university examination). Although this could suggest that a degree of test anxiety could be beneficial in boosting academic performance, the published study did not contain a detailed methodology, discussion or limitations section, nor did it measure, or account for, the effect of other variables on prior academic attainment. Despite this, one interesting point for further discussion may be the potential negative impact that feeling a low amount of test anxiety may have on academic performance, if not well-being.

Some approaches that educational establishments have taken to try to help reduce students' examination anxiety and increase well-being involve relaxation, and cognitive and behavioural techniques. Studies have demonstrated a reduction in students' test anxiety scores following participation in holistic, relaxation or physical exercise interventions (Kumar & Singh, 2017; Reed & Saslow, 1980; Rentala et al., 2019; Topp, 1989). However, to date, the majority of studies investigating methods of reducing test anxiety focus on undergraduate and college students, and there appears to be a continued dearth of research in this field for students in primary, secondary and further education - particularly in the United Kingdom. Ergene's 2003 meta-analysis, which synthesized data from 56 studies investigating the effect of test anxiety reduction programmes, also noted both the lack of research on younger students and the potential benefits the results from research into this age-range could yield for educators and psychologists working with these students. Ergene's meta-analysis reported that both behavioural and cognitive interventions were effective in decreasing examination anxiety. Medium effect sizes were found in programmes that used relaxation techniques, physical exercise and hypnotherapy. Interventions that focussed solely on a study skill-based approach generated only a small effect size; however, the report found that combining a skill-based approach with behavioural and / or a cognitive approach reaped high effect sizes. However, although these results show the potential benefits of different approaches to reducing test anxiety, they were predicated mainly on studies of university students.

A study by Yeo at. al (2016) examined the effect of Cognitive Behavioural Therapies (CBTs) on a group of elementary students (n= 115) in Singapore aged between 9-12 years old. Learners exposed to the experimental approach received four weekly 45-minute sessions, which taught them techniques, such as: balloon breathing; remembering a special memory to help remain calm, and relaxing their muscles. Results showed no difference in academic anxiety between experimental and control groups either pre-test, or immediately post-test.

However, the two-month follow-up demonstrated a significant difference between groups, with the experimental group self-reporting reduced test anxiety. It may be that, as Yeo et. al. suggest, utilizing CBT techniques takes a period of time to embed and take effect, which could be why they demonstrate an increased effect over time and not immediately post-intervention. Research by Astrid Gregor (2005) investigated the effects of different approaches aimed at reducing extreme test anxiety in older students studying for their GCSE examinations. The participating secondary school committed to the project as it perceived that it met the needs of its students by establishing systems which would support students who suffered from extreme examination anxiety and foster a climate where anxiety could be openly discussed. This need was identified following the suicide of one of the school's students, in the previous year; the student had been thought to have been extremely anxious about not achieving high enough grades to be accepted into college. Participants (n=105) were all in year 11 and divided into four form groups, which were randomly allocated to one of the following conditions: relaxation only; cognitive behaviour only; a mixed methods approach (consisting of a combination of relaxation and cognitive behavioural interventions), and a control group. The results were measured using teacher-rated assessment of students' anxiety; students' self-reported assessment of their examination anxiety, and GCSE final examination grades. Experimental groups were coached in different strategies for management of examination anxiety and exposed to five 45-minute sessions delivered jointly by their form teacher and an educational psychologist. The study demonstrated mixed results, with teacher-rated perceptions of students' anxiety deviating from self-rated student reports, indicating that teachers in the study may not have been able to identify students' signs of anxiety accurately. Despite this, results showed that both groups perceived the relaxation-only approach as being the most effective. Furthermore, both teachers and students rated the mixed-methods sessions as least effective, with both group observing this approach as increasing post-intervention anxiety scores,

compared to pre-test scores. It was not possible to compare student-responses to qualitative evaluation forms between these two groups as the relaxation only group did not complete the surveys due to teacher absence. Although the study demonstrated the potential value of future study in using relaxation methods as a way of helping students reduce their text anxiety in authentic secondary school setting, the intervention was run in stand-alone sessions that were not linked to individual academic skills. The results indicated that there were no statistically significant differences between the three groups in final teacher-assessed GCSE grade predictions. Pre-examination scores were predicated on teachers' GCSE grade predictions, rather than specific tests in a controlled GCSE high-stakes examination environment. Given the range of marks that fall within a single GCSE grade, it may be that a comparison of marks, rather than a grade achieved in similar assessments (such as between a past GCSE paper and a GCSE final examination) may be a more robust and nuanced measure of the effect of such interventions on academic performance. Study 1 of this thesis addressed this by ensuring that all assessments completed by participants were past-GCSE examination papers from the same examination board and specification; moreover, their results were recorded as a mark, rather than a GCSE grade to enable more specific distinctions in data analysis.

2.4.5 Examination anxiety and cognitive strategies.

Although, physiological and physical techniques can be beneficial in helping reduce the effects of excessive examination worry in secondary school students, it may also be that helping students prepare effectively for how to tackle tests successfully is an effective method of reducing pre-, and post-test anxiety. Research suggests that providing learners with study skills can help them feel more in control of a test situation and mitigate examination anxiety (Bradley et al., 2010; Dodeen, 2009; Dodeen et al., 2014; Howard, 2020). If a student feels well-prepared because they are confident about their subject knowledge; understand the success criteria and

how to meet them, and know how to tackle the examination task successfully, it could help to reduce their anxiety as they feel ready, well-equipped and even enthusiastic to meet the challenge. In contrast, a student without the necessary knowledge and skills may experience increased anxiety because they feel they are insufficiently prepared to be able to perform well. In 2019, Ofqual published a series of blogs about examination pressure and anxiety. These were designed to both educate parents, teachers and students in the factors exacerbating test anxiety and to support students to negotiate and cope with feelings of worry brought on by examination pressure. In a blog written to demonstrate students' perspectives of examination pressure (Ofqual, 2019b) both students interviewed acknowledged that low levels of stress helped motivate them to complete the work; however, high amounts of pressure overwhelmed them so they found it difficult to motivate themselves and complete the work. Furthermore, both students felt that their lack of understanding in how to revise and what strategies to use added to this stress. One student stated that although teachers were telling them to revise, they did not know what that meant or how to do it. The other student also felt their anxiety about revision was increased by not knowing which strategies to use to help them tackle it, "…the whole time you're thinking 'is this going to be something I remember? Am I doing it right? Should I be reading stuff or making flash cards or something?'" In 2020, Ofqual published its report, which reviewed the literature about anxiety for educational assessments (Howard, 2020). The report noted that effective study habits were helpful in reducing test worry as they help students prepare and feel prepared and, therefore, ready to take examinations. This was something that both students who contributed to the Ofqual blog (2019) about students' perspectives on examination pressure also described. In addition to advising teachers to be "gentler" with students they also agreed that advice on how to complete revision would help reduce worry about examinations, as one student interviewed for the blog noted, "'because there's different types and one type doesn't work for everyone. I think it's quite important.'

Advice on specific revision techniques would 'make you more confident…and reduce stress.'" If this is the case, it may be teaching students a metacognitive approach that explicitly demonstrates to learners the cognitive strategies they can use and how to apply them may be beneficial in helping to reduce feelings of worry. Furthermore, an understanding of how to plan, monitor, evaluate and reflect on their learning may also help reduce stress by giving students a greater sense of agency in their learning by finding an approach to a task that works for them. Study 1 will investigate if teaching students *Macbeth* using a metacognitive approach, that explicitly teaches students a range of strategies that can use to tackle different assessments, can help reduce students' test anxiety. Strategies used by students in this study will be explicitly modelled as part of a process that builds towards students being able to use the strategies modelled to them independently as teacher supported is faded away. The aim is that it will build students' confidence in knowing how to use the knowledge they have acquired to tackle an examination question and reduce anxiety as they are prepared with the skills required to help them complete GCSE English literature (*Macbeth*) examination tasks.

2.5 Self-efficacy

2.5.1 Academic self-efficacy

Self-efficacy is the belief an individual has about how successfully they will be able to complete a task (Bandura, 1977). There are a number of factors which can influence academic self-efficacy, such as home environment (Bandura et al., 1999a; Meece, 2001), the school environment and peer groups (Schunk, 1987). For example, students who can see that their peers are successful in completing tasks may consider themselves as more likely to complete a task successfully, compared to students who see their peers fail in similar tasks (Schunk, 1987). The academic setting of students based on prior ability could, therefore, be detrimental to self-efficacy as students placed in sets based on low-prior attainment are less likely to see examples

of students succeeding than those placed in sets based on high-levels of prior academic attainment. Thus, students in lower attainment sets may perceive themselves as less able than students in higher sets, which may make them believe they cannot tackle assessments successfully (Connolly et al., 2019; Pajares, 1996; Parsons & Hallam, 2014). Although self-efficacy has some similarities with self-concept, self-concept is based on an individual's view of themselves more generally, whereas self-efficacy relates to their view of how effectively they will complete a specific task (Bong & Skaalvik, 2003). Academic Self-Efficacy (ASE) relates to how successfully students think they will be able to complete a specific task, such as an assessment evaluating how Lady Macbeth is presented throughout the play, *Macbeth*. In contrast, academic self-concept refers to how competent an individual believe themselves to be in a certain field, or subject, such as English or mathematics (Schunk & Pajares, 2002).

2.5.2 Academic self-efficacy and academic achievement

Studies into the association between self-efficacy and academic attainment (Bandura & Jourden, 1991; Wood & Bandura, 1989) have that found that low self-efficacy can have a negative impact on student performance because a lack of self-efficacy undermines learners' academic capability in a task, so that they are more likely perform badly. Conversely, there is research to demonstrate that self-efficacy can positively influence academic motivation, persistence and achievement (Fatih & Dandini, 2020; Pajares, 1996; Schunk, 1995). This suggests that high self-efficacy could be an influential factor in predicting the academic performance of students. Research also suggests that self-efficacy is likely to be malleable (Bandura, 1977; Bandura & Schunk, 1981; Schunk, 1991), and therefore (like self-regulation) can be developed in students. Honicke and Broadbent's systematic literature review (2016), which explored the effect of academic self-efficacy on academic achievement, sought to analyse what the results of studies intimated about the association between academic self-

efficacy and academic performance. Fifty-one studies were included in this meta-analysis, which found "overwhelming support" for a moderate positive association between academic self-efficacy and academic performance. Furthermore, the review suggested that this could be because students with higher levels of academic self-efficacy were more likely to be: tenacious when completing complex tasks; choose more difficult tasks and, if they were not succeeding, change strategies to help them complete a task. As a result of these actions, students were more likely to succeed academically as they were more adaptive and ambitious in their approach to learning than students with lower levels of academic self-efficacy In addition, factors such as academic effort and self-regulation also appeared to be related to academic self-efficacy. This suggests that learners with higher levels of academic self-efficacy may perform better academically because they are more able to self-regulate the level of effort they put into a task when faced with distractions, such as boredom and peer pressure to stop studying, and less prone to academic procrastination.

However, self-efficacy on its own is not enough to determine success in academic assessments – students must also have sufficient subject knowledge and an understanding of how to tackle and complete the assessment. Honicke and Broadbent's review found that ASE appeared to be a poor indicator of academic performance in new undergraduates at the start of an academic term (Galyon et al., 2012). As students would be unfamiliar with course content, subject knowledge and relevant cognitive strategies in a new learning environment, it is understandable that they would feel less confident about their ability to complete an academic task than students with more experience and knowledge in the course. Although there is little research, to date, about the self-efficacy of British secondary students at the beginning of an academic unit, compared to later on in their studies, Study 1 will address this by using the self-efficacy section (Pintrich, 1991) from the Motivated Strategies for Learning Questionnaire (Figure B2) to allow all participants to self-rate their self-efficacy traits at both the start and of

the intervention. This will allow the study to investigate if increased subject knowledge and familiarity with the course increases self-efficacy in participants, and if students exposed to the metacognitive approach develop higher levels of self-efficacy that those in the control group.

Bandura's studies into self-efficacy led him to differentiate self-efficacy from outcome expectancies (2010), theorising that the former related to an individual's perception of how proficient they considered themselves in completing a task, whereas the latter related to an individual's perception of how successful the result would be at the end of the task. In an educational context, academic self-efficacy can be perceived as relating to a student's belief about how well they are able to learn or understand information, or to complete academic tasks such as assessments, essays, and high-stakes tests. Thus, a student tasked with completing the essay question, "How does Shakespeare present the character of Lady Macbeth in the play, *Macbeth*?" would have a high level of academic self-efficacy if they believed they were fully capable of answering this question in the required format, which differs from their outcome expectancy of the grade they think they will achieve in the assessment. This suggests that two different students could demonstrate high self-efficacy in their perception of being able to complete the assessment, but one student could have an outcome expectancy of a GCSE Grade 5, whereas the other student expects a Grade 8. Although there appears to be a disparity between the two students' expected outcomes, despite their high self-efficacy, it does not take into account either students' prior achievement, target grade or the result achieved in the assessment. This study will address this by collating baseline self-efficacy ratings and baseline assessment results before the intervention begins to investigate a possible relationship between student performance and self-efficacy, and if the explicit metacognition intervention has a positive impact on either.

2.5.3 Academic Self-Efficacy and Academic Anxiety

In addition to having a negative impact on mental and psychological well-being, academic anxiety can have a significant effect on an individual's ability to perform in high-stakes academic examinations as it can temporarily impede the brain's ability to remember facts and process information. Bandura (1988) posited that an individual's level of self-efficacy could influence how they perceived, and consequently reacted to a stressful event. Thus, if a person has a low-level of belief that they can complete a task (such as a high-stakes academic assessment) they are more likely to see the event as threatening, which can trigger high levels of anxiety. In contrast, a person with a high sense of efficacy that they will be able to cope with the demands of the task will be more likely to deem the event a challenge that can be completed and feel less worry about it. A 2011 study by Nie et al. sought to investigate if increased academic self-efficacy could moderate academic anxiety in a sample of secondary school students from Singapore (n=1978). All participants were in Grade 9, which is the equivalent of Year 10 students in the current English educational system; students self-rated their academic self-efficacy, test importance, and academic anxiety using an on-line questionnaire. The results demonstrated that students with higher levels of academic-self-efficacy presented with lower levels of academic anxiety. In addition, there was a positive relationship between high task importance and high test anxiety when academic-self efficacy was low; however, when academic self-efficacy was high there was no significant link between high test importance and high examination anxiety. Although this study demonstrated that increased academic self-efficacy could regulate academic anxiety, it did not examine the possible effect that this moderation could have on academic performance, or of how they could be mitigated by metacognitive and self-reglatory processes in addition to improving academic attainment. It may be that improved self-efficacy could lead to reduced academic anxiety, as the

Metacognitive Task Completion Process (MTCP) model (Figure 2.1), which was designed as part of this study, proposes.

Although the MTCP model theorises that understanding of success criteria, subject knowledge and cognitive strategies may all impact upon student self-efficacy and academic anxiety, it also suggests that the evaluation and assessment processes in metacognition and self-regulated learning may influence student perceptions of self-efficacy and academic anxiety. As the Task Completion model (Figure 3.1) - which is a component part of the MTCP model (Figure 2.1) - demonstrates, the relationship between the processes of academic metacognition and self-regulated learning, and the successful use of the metacognitive and self-regulatory processes require a secure understanding of success criteria, subject knowledge and cognitive strategies. However, this understanding may not sufficiently improve self-efficacy, or reduce academic anxiety if the student does not know how to apply this understanding to complete the task. In this instance, an assured understanding of how metacognitive and self-regulatory processes can be used to help them apply their knowledge to the task may not only help them complete the task successfully, but also improve their belief that they can complete the process of the task, and thus reduce academic anxiety. Moreover, the capacity to be aware of one's own thoughts and self-regulate during a task, also creates the capacity for learners to consciously recognise, monitor and control their anxious thoughts in order to reduce them (Smith, 1980). Providing students with cognitive strategies that specifically help learners who feel worry at the start of, or during a task, which they can select as part of the metacognitive process, may help reduce academic anxiety. Strategies could include creating a plan to organise their thoughts; adding notes to it as they write (so they do not forget to add them into their assessment response later on), or reflecting on an occasion when they had successfully completed a similar task before, which may empower them to feel that they can complete the process of the task successfully and thus boost their academic self-efficacy.

2.6 Teacher self-efficacy

Teacher self-efficacy (TSE) is broadly a measure of how secure a teacher is in their aptitude to develop and improve the learning of students (Bandura, 1994). Low teacher self-efficacy is negatively associated with teacher burnout and poor emotional wellbeing (Savas et al., 2014; Schwarzer & Hallum, 2008; Skaalvik & Skaalvik, 2014). Although there is some debate about whether low levels of self-efficacy predict teacher burnout (Schwarzer & Hallum, 2008; Skaalvik & Skaalvik, 2014) or teacher burnout results in lower levels of self-efficacy (Kim & Burić, 2019; Madigan & Kim, 2021), there is little doubt that burnout can have a damaging effect on those that experience it, and low levels of teacher self-efficacy have been associated with low levels of teacher wellbeing (Kim & Burić, 2019; Savas et al., 2014; Zee & Koomen, 2016). English schools, particularly in the Secondary sector, are currently experiencing both an ongoing recruitment and retention crisis (Fullard & Zuccollo, 2021; See & Gorard, 2020), exacerbated by increasing levels of stress, combined with decreasing levels of job-satisfaction, emotional well-being and work-life balance. While it is clear that increased teacher self-efficacy is by no means a silver bullet that can single-handedly solve these issues, it may be that increasing teacher self-efficacy (and thus feelings of agency and self-belief in their teaching ability) could help improve teacher well-being.

In addition to the impact on teacher wellbeing, some studies also suggest that increased teacher self-efficacy can have a positive impact on student attainment and attitudes towards their teacher's ability to affect what happens in the classroom (Klassen & Tze, 2014; Mojavezi & Tamiz, 2012; Nathaniel et al., 2016). In contrast, low self-efficacy may negatively impact student attainment and teachers' attitudes towards how able they are to teach. Gibson and Dembo (1984) investigated the link between teachers' self-efficacy beliefs and their beliefs in their ability to teach and motivate challenging students. Their findings indicated that teachers with higher levels of self-efficacy perceived themselves as being able to teach and motivate

more challenging students, as well positively impacting external influences, such as lack of family involvement. In contrast, teachers with low-self efficacy believed that they did not have the capacity to motivate these students, or positively impact on external factors. Low teacher self-efficacy may also be associated with teachers adopting a more rigid approach to teaching, and using punishments to make students study (rather than positive encouragement) as they have less self-belief in their ability to be able to get students to complete work (Woolfolk & Hoy, 1990; Woolfolk et al., 1990). Thus, a teacher with low self-efficacy may set a task, such as learning 15 quotations about Lady Macbeth, and inform students that they will be given an hour's after school detention if they do not learn all 15 quotations. This may not only create a negative relationship between the teacher and their students, where they are only motivated to work in order to avoid negative sanctions, but also foster an environment where students are not shown the benefits of learning the quotations and how this information can help them attain better grades in a high-stakes examination and develop their memory skills. This gradgrindian approach could put students in danger of only completing academic tasks because they have to, rather than because they want to. Furthermore, it negates using a metacognitive process, where student think about *how* to learn because there is no need for them to be process orientated, when the reward (or lack of punishment) is outcome orientated. This negative, approach to teaching may also lead into an increase in academic stress and anxiety as students fear punishment and perceive assessments as the only measure of their worth.

Research conducted by Kim (2011) explored the correlation between teacher self-efficacy and teachers' understanding of metacognition in 215 early-years third and fourth year trainee teachers in four South Korean universities. Results indicated that the trainee teachers with a greater understanding of metacognitive knowledge self-rated higher levels of teacher self-efficacy; however, this varied depending upon the particular strategies that participants used when solving problems, For example, participants who chose "free production"

(producing as many ideas as possible and evaluating each one before choosing the best) recorded higher levels of self-efficacy than those who chose the "step by step" strategy (working methodically through a sequence of stages to reach a solution systematically). Although this may suggest that increased metacognitive knowledge can increase teacher self-efficacy, results were limited to participants who has only spent a short amount of time (an average of 4 weeks) in the classroom and had little practical teaching experience. Currently, little research exists exploring the link between teachers' metacognitive understanding and teacher self-efficacy, or if either of these factors are related to length of teacher-service and the age range taught. There remains, to our knowledge, no study in British schools investigating a possible link between teachers' understanding of, and attitudes towards, metacognition and their use of metacognitive processes in the classroom, or if these factors influence teacher self-efficacy The current study seeks to address this gap in the literature by collecting data on teachers' understanding, attitudes, length of service, and self-efficacy in British schools in Study 2.

2.7 Face-to-face classroom and online teaching

2.7.1 Covid 19 and the move to Online Teaching

The closure of schools due to the Covid 19 pandemic meant that educators had to make the rapid switch from teaching in the classroom to teaching using online platforms. During school closures, students in the United Kingdom were expected to engage in online learning as the main way of accessing educational materials, instruction and teaching. However, a number of issues made this problematic for both educators and students, especially during the start of the lockdown when the unprecedented scale and abruptness of the shift to online learning meant that many schools, teachers, families and students were unprepared for the rapid transition. Issues encountered by students included lack of familiarity and training with online platforms;

limited access to appropriate technology (especially for those living in low-income households) and varied levels of parental support or ability to be able to help their children engage in this form of learning. Although loss of learning could be perceived as one of the most pejorative effects of the move to distance learning during the Covid-19 pandemic, the extent of this loss varied from student to student, leading to concerns that disadvantaged students and those from low income households were making less, or no progress compared to peers from higher income household with more educated parents (Bayrakdar & Guveli, 2020; Blundell et al., 2022; Blundell et al., 2021; Coleman, 2021), which may have been partially due to a lack of the technology within lower-income households required to access online platforms.

Research into teachers' capabilities in online teaching suggest that online teaching proficiency is positively related to online learning outcomes for students and that teachers' self-efficacy in teaching online can be improved by targeted professional development (Corry & Stella, 2018; Y. Liu et al., 2022). However, during the Covid-19 pandemic teachers were initially unfamiliar with many of the digital platforms and tools used to facilitate online learning during the pandemic (Hassan et al., 2020). This is likely to have impacted on their proficiency to deliver lessons effectively and caused them to make adaptations to lesson content and delivery to ensure that curriculum content was being taught effectively to meet the needs of their students. To our knowledge, there are no studies investigating if teacher understanding or use of metacognition in their own practice is associated with more explicit modelling of metacognitive and cognitive strategies in the classroom, in comparison to online teaching. Study 2 seeks to address this by investigating if there is a difference in the type, or frequency, of the explicit modelling of metacognitive and cognitive strategies between teaching in the classroom and on line, and also if teacher understanding or use of metacognition is associated with more explicit teaching of these strategies in either scenario.

Research Questions:

Building on the theoretical and empirical literature reviewed in this chapter, a series of research questions were identified to be addressed in two separate studies. Study 1 investigates the impact of teaching students a GCSE English literature text (*Macbeth*), using a metacognitive approach. Study 2 investigates teachers' understanding of metacognition and use of it in their teaching practice.

Study 1:

1. Do Year 9 GCSE English literature students exposed to a combined metacognitive and knowledge-based approach to teaching *Macbeth* show higher levels of academic attainment, accuracy for memorising quotations, metacognition and self-efficacy than students exposed to a knowledge-only based approach?
2. Do Year 9 GCSE English Literature students exposed to a combined metacognitive and knowledge-based approach to teaching *Macbeth* show lower levels of academic anxiety than students exposed to a knowledge-only based approach?

Study 2:

1. How much do teachers understand about metacognition and does this differ on the basis of participation in relevant CPD, teaching experience, subjects taught, Key Stages taught, gender or geographical region of the United Kingdom?
2. Are higher levels self-reported understanding of metacognition and use of metacognition associated with higher levels of understanding of self-efficacy, and higher levels of use of self-efficacy for teachers when considering their own practice?
3. Are higher levels of self-reported understanding of metacognition associated with higher levels of use of metacognition for teachers when considering their own practice?

4. Are higher levels of self-reported understanding of metacognition or use of metacognition when teaching associated with more frequent explicit modelling of metacognitive and cognitive strategies to students in both classroom and online teaching?
5. Is there a difference in the type, or frequency, of explicit modelling of metacognitive and cognitive strategies between teaching in the classroom and teaching via online platforms?

Chapter 3

Literature Review: Intervention Design (Study 1)

3.1 Metacognition, domain knowledge and success criteria

When a student undertakes an academic assessment, they need a secure understanding of both domain knowledge and success criteria. Domain knowledge is specialist, subject-specific knowledge and in the study of GCSE English literature may include knowledge of literary techniques as well as the plots, themes and characters of examination texts (such as *Macbeth*). An understanding of domain knowledge plays a key role in the metacognitive process as learners need to be able to utilise this information in order to complete the task (Kluwe, 1982). No matter what approach a student may adopt when writing a GCSE literature essay, they have to have at least a basic understanding of the text in order to attain a GCSE grading. For example, this is one task from the Eduqas (examination board) autumn 2021 GCSE English literature Shakespeare component: "Write about the supernatural in *Macbeth* and how Shakespeare presents this theme throughout the play. Refer closely to characters and events from the play in your answer." To be able to tackle this successfully students will require domain knowledge, such as the events in the text, characters, and the theme of the supernatural and how it manifests throughout the play. Once students have this knowledge they can then take a metacognitive approach to the task by preparing which cognitive strategies they will use to tackle the answer successfully, monitor how successful these are throughout the task (and maintain or change the use of their chosen cognitive strategies as appropriate) and then evaluate and reflect on the success of their approach upon completion.

However, this does not mean that the metacognitive process only comes into play when all domain knowledge has been acquired. It can also be utilised by students to help them acquire and develop their domain and lexical knowledge, which will then help them complete a task.

Lexical knowledge is broadly an understanding of words (Caro & Mendinueta, 2017) and by developing this understanding learners will be able to both express themselves (Hwang & Cabell, 2021) and analyse language more extensively. For example, when studying some of the archaic and complex language in *Macbeth*, a student could select a cognitive strategy, which builds on prior domain knowledge, to help them develop further domain knowledge and understand the text. When Lady Macbeth chides her husband for his behaviour at the coronation banquet, "You have **displaced** the mirth, broke the good meeting, / With most admired **disorder**." the student could choose to focus on the prefix of "dis" used in two of the words. Their prior knowledge that "dis" is a negative prefix, which means "none", or "not" could help them successfully work out what the words mean. However, after reflecting upon this cognitive strategy, the student may realise that applying this strategy to "mirth" is unlikely to be successful, so the student would need to begin the metacognitive process again to select a different strategy to help them, such as using a dictionary.

In addition, students need to be cognisant of relevant success criteria if they are to complete a task successfully and undertake the evaluation stage of the metacognitive process. For example, a student undertaking the Shakespeare component of a GCSE English literature examination needs to have a secure understanding of the criteria for them to them to be able to meet the different grade boundaries. If they are unsure of what they need to do to meet the criteria in the different GCSE grading bands they will be unable to judge which areas they have succeeded in, or what they need to do to improve in order to achieve an appropriate academic goal. For example, the Eduqas Examination Board's GCSE English Literature Assessment Objectives Grid (Success Criteria) for the Shakespeare Extract Component (Component 1a) requires students to use subject terminology in their written responses (Figure 6.9). This ranges (from the top band down) from "precise subject terminology in an appropriate context"; "apt subject terminology"; "relevant subject terminology"; "may use some relevant subject

terminology", to "may use some subject terminology, but not always accurately". However, knowledge of subject criteria also requires students to have lexical understanding of what the different words in each criterion mean, such as the difference between "precise", "apt", "relevant" and "some". They also require both lexical and domain knowledge of what the term, "subject terminology" means and different types of terminology that they could deploy in the task. Although students could tackle the question about the theme of the supernatural in *Macbeth* without an understanding of the success criteria, knowing the criteria they are being assessed upon gives them a clearer understanding of how to achieve success in each of the different GCSE bands. Once they understand this, they can then use the metacognitive process to help them select the correct terminology required for the context, reflect upon which level of the criteria they are meeting, and what they need to do in order to improve and progress to meet the criteria in a higher band. Lessons in Study 1 were designed to give students opportunities to explore and develop their understanding of the success criteria they would be assessed on to measure their academic attainment (see Figure 4.8 for an example of a lesson slide with the success criteria included).

3.2 Cognitive and metacognitive strategies

Metacognitive strategies differ from cognitive strategies insofar as metacognitive strategies are used to direct learners to and help them focus on and manage the metacognitive process, whereas cognitive strategies are learning strategies deployed help with successful task completion and are used within the metacognitive process. Initially, it may appear that , as with the definition of metacognition, a range of terms and approaches are used to categorise both cognitive and metacognitive strategies. Although no study to date has investigated this, a number of pedagogical blogs and articles appear to use the term metacognitive strategies to describe both cognitive and metacognitive strategies, such as spaced learning and dual coding.

This may be because the diverse definitions of metacognition also make it difficult for researchers to establish a definitive "agreed" list of metacognitive strategies (Perry et al., 2018). However, it may be that although there is a growing thirst among teachers to develop their understanding of cognitive science and employ cognitive strategies in the classroom, variations remain in how well such approaches are understood and applied to the classroom (Perry et al., 2021), leading to the possiblity of "lethal mutations". In a meta-analysis of learning strategy instruction on academic performance (2014), Donker et. al. categorised academic strategies into three different strands. These were: management strategies, cognitive strategies, and metacognitive strategies. Management strategies were related to the context of learning and included the management of effort, peers and others, and the environment. These appear to relate to stages within the self-regulatory process, proposed in Figure 2.4, insofar as they relate to an understanding of the environmental and motivational factors, which may affect learners 'engagement in the metacognitive process. The study defined cognitive strategies as those strategies which can be used to increase understanding in a specific field and referred to the utilisation of learned information and were linked to a particular area, or task. These were further subdivided into three primary strands: rehearsal, elaboration, and organisation. Rehearsal strategies are used for repeating material and can be employed by students to help them learn, or remember information, such as a list of quotations from *Macbeth*. Elaboration strategies, such as paraphrasing and summarising, help students make connections between prior knowledge and new learning; for example, summarising contextual knowledge about Jacobean attitude to witches and the way that the witches are portrayed in *Macbeth* to make links between the two. Organisation strategies, including drawing graphs and mind maps, also support students to make connections across different components of knowledge, such as evaluating how the theme of the supernatural is explored in *Macbeth.* In comparison, the meta-analysis related metacognitive strategies to the regulation of learners' thinking. Again, three

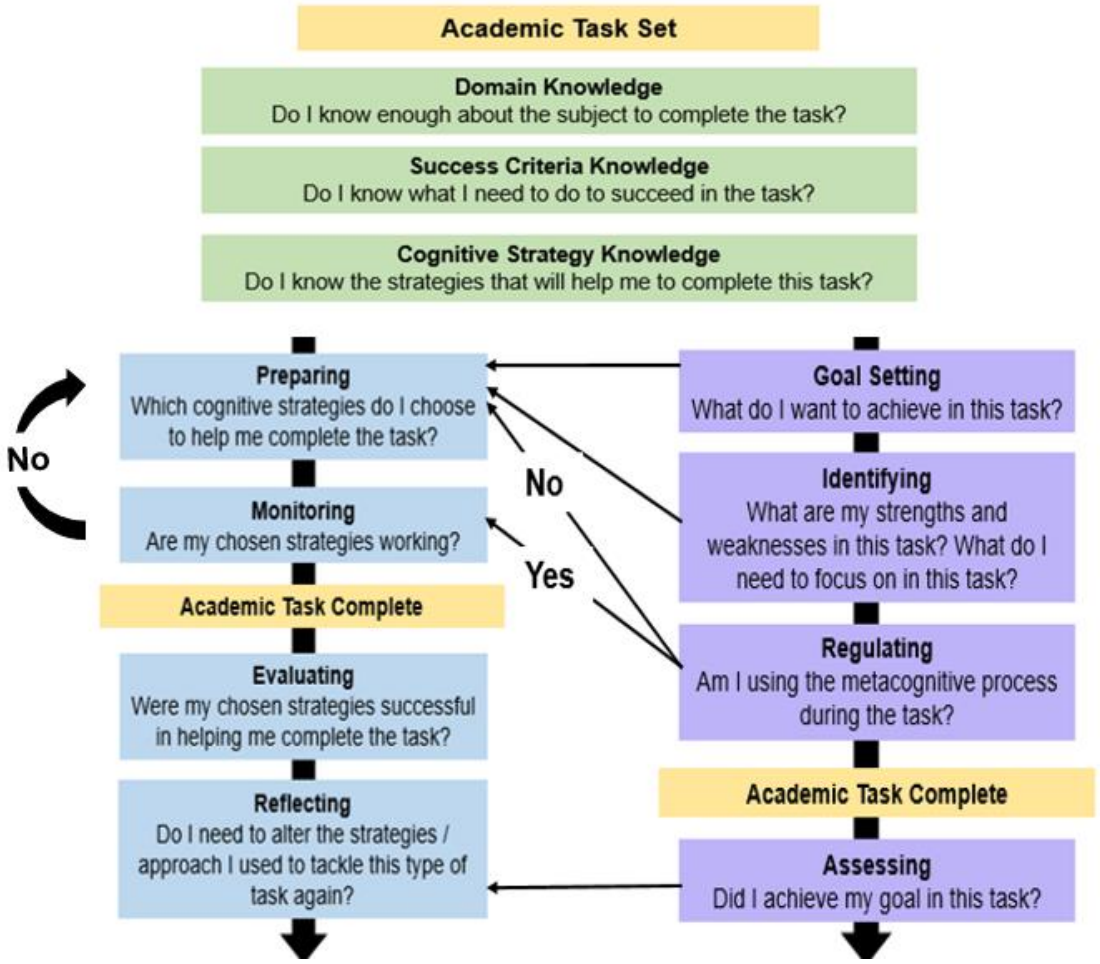
sub-categories were identified and these were related to the different stages of regulation: planning, monitoring and evaluating, stages which appear to relate directly to different stages within the metacognitive process. For example, students begin by using planning techniques before starting a task. During the monitoring stage, students self-assess their understanding and alter their approach during a task, if their current approach is not successful. Finally, evaluation occurs at the end of a task, when a student examines how successful the approaches they used were in helping them complete the task. Thus, the different strands identified in this meta-analysis differentiate between cognitive and metacognitive strategies, with metacognitive strategies relating specifically to different stages in the metacognitive process.

The EEF Guidance Report on Metacognition and Self-regulated Learning recommended educators to explicitly teach metacognitive strategies to students, suggesting that although students may develop some of the strategies independently, most will not and would, therefore, benefit from direct instruction (Quigley et al., 2018). The report divides metacognitive strategies into three categories, each of which relates to a specific stage in the three-part process they identified as forming the metacognitive process: planning, monitoring and evaluating (as shown in Figure 2.2). It suggested that teachers could begin prompting students to adopt a metacognitive approach by using targeted questioning. Although metacognitive strategies are not subject, or stage specific they can be applied to different curriculum areas and subject specific tasks. Thus a student given the task of learning 15 quotations about Lady Macbeth, could be directed to plan for the task by prompting them to ask themselves questions such as: “What resources do I need to help me carry out the task?”; “Have I memorised vocabulary or quotations before?” and “What strategies have I used before that were successful?” During the monitoring phase, after they have begun the task, they could be prompted to ask themselves: “Am I able to remember all of the quotations?” and “Do I need to try different techniques to help me get better at learning quotations?” Finally, after the

completion of the task, evaluation questions might include, “How successful was I at learning all 15 quotations?”; “Which technique helped me memorise the quotations the best?”

However, although metacognitive strategies direct learners to consider the metacognitive process they are not cognitive strategies. Possible confusion between the two different types of strategies may be in part due to the way that working metacognitively involves students using cognitive strategies as part of the metacognitive process. Metacognitive strategies rely on students having a range of cognitive strategies at their disposal to help them complete the academic task. Cognitive strategies are the different strategies that students could use to enable them to complete an academic task – a task relating to education or learning, such as writing an essay in response to an examination question. Examples of these strategies include: skimming a document and highlighting key information to help them identify the evidence they will use to support their answers; using dual coded revision cards and spaced learning to help them memorise quotations; asking peer for help; using prior knowledge to help decode vocabulary, and using a mind map to help them plan their ideas. Students employ the metacognitive process of selecting, monitoring, evaluating and reflecting on the cognitive strategies required to help them complete the academic task. Within the Metacognitive Task Completion Process model developed for this study on the basis of previous theories and empirical literature (Figure 2.1), part of the preparation stage involves students selecting the cognitive strategies that (based on their understanding of the task, success criteria and reflection of how well these cognitive strategies worked in equitable tasks) they believe will help them complete the task most effectively. Simply put, these are thinking strategies that students deploy as part of the metacognitive process, developed by the researcher for this study, as shown in Figure 3.1.

Figure 3.1 *Task Completion Process Model (a component part of the MTCP model)*



This Task Completion Process model builds on the Metacognition and Self-regulation Association model (Figure 2.4) as it demonstrates the role that domain knowledge, success criteria knowledge and cognitive strategy knowledge play in student task completion. In this model, once the task has been set, the student must have sufficient knowledge of these three components before they can fully utilise metacognitive and self-regulated processes to help them achieve the task. Although the metacognitive process empowers the students to be able understand and use cognitive strategies, to complete the task, the self-regulatory process is required to ensure that the metacognitive process is used during the task completion in order to achieve their goal. Moreover, this model demonstrates that although both the metacognitive and self-regulated learning processes initially appear linear, they are closely linked and inter-

dependent on each other, and both processes continue even after the task has been completed. During the metacognitive process learners can also adapt the strategy to the type of task they are working on and switch to a different strategy if the one they are using is not successful or effective enough. For example, cognitive strategies to help learn spelling can include: creating mnemonics; chunking words into parts; thinking about how the word sounds phonetically: using visual clues in the words; learning about root words, and the meanings of pre-fixes and suffixes; remembering words within words and spelling rules. Once the student knows these cognitive strategies, they can then apply the most appropriate ones to individual words, or groups of words to help them spell the words correctly. For example, recognising that the word "be**lie**ve" contains a "lie" in it, or that the word "necessary" can be formed from the mnemonic "**n**ever **e**at **c**hocolate **e**at **s**alad **s**andwiches **a**nd **r**emain **y**oung". If students consciously select appropriate strategies for different words, then they are beginning to think metacognitively. To develop this metacognitive process, they should also evaluate whether they have successfully learnt the information. If they have not learnt it, then they should reflect upon why the method was unsuccessful and how they could use an alternative technique to help them learn it successfully next time.

Despite the significant role that cognitive strategies play in the metacognitive process, the EEF's evidence review of cognitive science approaches in schools (Perry et al., 2021) noted the difficulty in applying theoretical cognitive science principles into the classroom. The report posited that this was partly due to the complexity of the classroom environment compared to the more rigid and regulated conditions within a laboratory setting. Classroom environments can differ, even within the same school, as teachers need to take into account and manage factors such as individual student needs, student behaviour, student prior attainment and curriculum content when planning their lessons. Furthermore, teachers will have different levels of understanding of the theory underpinning cognitive science and cognitive strategies,

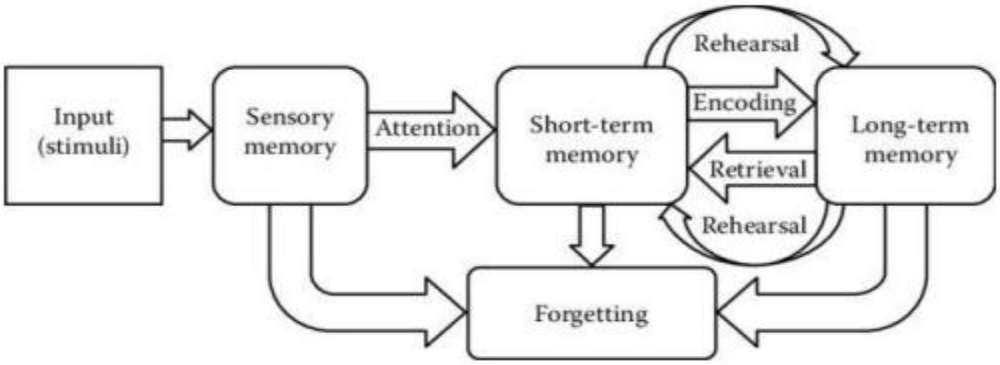
which will affect effective implementation within the classroom. Poor understanding and implementation may also lead to "lethal mutations", where practical application in the classroom is no longer informed by, or attached to, the theory that underpins it. The report evaluated the impact of seven different approaches in applied cognitive science, focussing on cognitive science studies conducted in authentic classroom settings with learners aged between 3- 18. However, it was also noted that the number of studies undertaken in authentic classroom environments and delivered by teachers (rather than in laboratory settings and, or, by researchers) was limited either to specific subject-specific areas (also true in the current study) and age ranges, or by the low amount of studies investigating an approach. Four of these approaches were used as cognitive strategies in the intervention designed for students participating in the research for the current study, which was delivered by the students' time-tabled teachers in an authentic classroom setting. These approaches were: Cognitive Load Theory, spaced learning, retrieval practice and multimedia learning (dual-coding).

3.2.1 Cognitive Load Theory

The cognitive strategy of managing students' cognitive load is based by research by John Sweller into the differences in the difficulties individuals experience when learning information (1994, 2011). Sweller initially sought to investigate why one task, which seemed to contain approximately the same amount of information as another took much more effort to learn (1994). He posited that cognitive load consisted of two dichotomous categories: extraneous cognitive load and intrinsic cognitive load. Of the two, extraneous cognitive load appears to be the one teachers have the most control over as it involves the way information is presented. In contrast, intrinsic information is dependent on how many interconnecting parts there are in an "element", which teachers may have less control over. Sweller defined an element as information that needed to be learned; however, he noted that this was dependent

upon an individual's previous understanding and the complexity of the knowledge being learnt. For example, a student with higher prior attainment and a basic understanding of the plot of *Macbeth* would experience a lower intrinsic cognitive load when learning about the theme of violence in *Macbeth* than a lower attaining student with no prior knowledge of the play. Cognitive Load Theory is also embedded with theoretical knowledge of how information is retained in the memory (Amin & Malik, 2013; Atkinson & Shiffrin, 1968, 1971; Perry et al., 2021), as shown in the diagram in Figure 3.2 , based on the work of Atkin and Shiffrin (1971).

Figure 3.2 *A Model of how Information is Stored in the Brain (Perry et al., 2021)*



Cognitive Load Theory is predicated on the notion that the working memory only has finite capacity and that for individuals to be able to remember information over a long period of time they need to both embed it into their long term memory and be able to recall it. However, before information reaches the brain, it needs to undergo different stages. Information is first imputed as stimuli and individuals are faced with a constant barrage of stimuli, which is then processed in the sensory memory. Examples of stimuli that a student in a GCSE examination room might experience include: the equipment on their desk; the instructions on the examination paper; the sound of an invigilator walking down the room; the smell of floor polish, and the coughing of the student in front of them. Not all stimuli are relevant, or required, so attention should be focussed on what is most important, such as the instructions on the examination paper, and this goes into the short term, or working memory.

The rest of the stimuli is eventually forgotten. For information to be retained in the long term memory, such as a list of quotations about Lady Macbeth (that can be used in an exam question about the theme of violence in the play) it needs to be rehearsed and recalled. The easier it is to embed and retrieve this information, the stronger the memory is.

Educationalist Dylan Wiliams posited that, "Sweller's Cognitive Load Theory is the single most important thing for teachers to know" (Wiliam, 2017) and it does appear that this understanding may be able to help teachers to remove irrelevant cognitive load as part of their metacognitive process. This can be achieved by removing extraneous input from information that pupils are exposed to (one of the reasons dual coding material should be judiciously selected so as not to add unnecessarily stimuli). However, this does not mean simply reducing the information students receive. Instead, it requires careful consideration of intrinsic cognitive load by directing learners' attention to optimal information based on prior knowledge. The EEF report on the use of cognitive science in the classroom (2021) also suggests teachers use strategies such as scaffolding information and giving worked examples to help reduce students' cognitive load. Students cognitive load was carefully considered when designing and creating the intervention materials for Study 1. For example, student glossaries were added to some lesson slides to help students unpick some of the complex language and archaic references in the text. By including these glossaries, the intention was to focus students' cognitive load on analysing and understanding Shakespeare's use of language so that they were not overwhelemed by the content of the orginal text (see Section 4.4.2 for further information).

3.2.2 Spaced Learning

Spaced learning is based on the theory that information can be more efficiently retained in and retrieved from the long-term memory if learning is separated by breaks (inter-study intervals) and retrieved. Students return to the information learnt after a break, the length of which can

vary from short intervals (e.g. within the same lesson) to longer ones that may span a school term. This strategy increases the challenge of learning as students have to work harder to retrieve information from their long-term memory after a break and re-learn forgotten information. Although effortful for students, this effort tackling "desirable difficulties" (Bjork, 1994) could be construed as having a positive impact if it amplifies the amount of information they can recall and remember . In its systematic review of cognitive science approaches in the classroom (2021), the EEF found that although spaced practice studies included in the review did not demonstrate high impact, they did indicate some promising results and further investigation into this field would be beneficial. See section 4.4.4 for more information on how spaced learned was used in the lesson design.

3.2.3 Retrieval Practice

Retrieval practice also involves the process of recalling learning from the long-term memory as a way of increasing long-term memory retention. Unlike spaced learning, retrieval practice involves testing and quizzing students on information they have learned and, initially, this process may be effortful as students experience "desirable difficulties". However, retrieval practice can be spaced and repeated, and in this way it is possible to combine both cognitive strategies, so information is retrieved at different intervals. Theoretically, information should become both more firmly embedded and easier to recall if it is repeatedly retrieved. Retrieval tasks could include students answering multiple choice quizzes, creating a chronological list of main events in *Macbeth,* or writing down as many quotations as they can remember about Lady Macbeth. This low-stakes quizzing also allows both the teacher and the student to assess progress and measure how much information has been retained. A meta-analysis of the effect of quizzing by Yang et al, (2021) found overall a medium effect size for use of this strategy in the classroom, while the EEF review (2021) found that, compared to restudy, retrieval practice

showed promising, if mixed, results and remained a highly relevant classroom strategy that merited continued investigation.

3.2.4 Dual Coding Theory

Dual Coding Theory (Clark & Paivio, 1991; Paivio, 2014; Paivio & Clark, 2006) is predicated on the theoretical premise that the working memory consists of two separate parts (one dealing with visual and spatial information and the other dealing with auditory information) and that learning can be increased by presenting learners with material in different ways . For example this could involve including relevant diagrams and pictures alongside written text to iterate new information, such as displaying a diagram showing the Great Chain of Being when explaining the Divine Right of Kings and how it relates to both King James I and the character Macbeth. Dual Coding Theory (DCT) is also closely linked to Cognitive Load Theory (Sweller, 1994, 2011) and the EEF report into the use of cognitive strategies in the classroom (2021) cautioned that teachers should be judicious when adopting DCT in lesson materials as it could result in students becoming overwhelmed if they are presented with too much information. Furthermore, they noted that although there was some theoretical evidence to suggest the benefits of dual coding to help students learn information, there was also a risk of Dual Coding Theory being misunderstood by educators, which may result in adding pictures to text that are irrelevant or merely decorative and do not add to learning. Examples of how dual-coding was used in the design and creation of lessons can be found in Section 4.4.4.

3.3 Teaching and modelling: a metacognitive approach

Research indicates that students' awareness of their own thinking can play a significant role in developing their metacognitive understanding (Brown, 1978; Dörr & Perels, 2019; Hacker, 1998; Quigley et al., 2018). Research also indicates that students' metacognitive awareness can benefit their academic attainment (Coutinho, 2007; Dent & Koenka, 2016; Young & Fry,

2008; Zulkiply, 2009), which suggests that there may be value in students knowing and being explicitly taught about metacognition in order to be able to think metacognitively in the classroom. Studies into the age that children can begin to use and apply metacognition to their learning, demonstrate that they are able to regulate their behaviour at a young age and also have the basic ability to plan , monitor and control their learning (Bandura et al., 1999a; Bronson & Bronson, 2001; Bryce & Whitebread, 2012; Dignath et al., 2008; Dörr & Perels, 2019; Özsoy et al., 2017; Whitebread & Coltman, 2010). However, the rate and level that learners will develop these skills will vary according to their learning environment both inside and outside school (Quigley et al., 2018). The EEF guidance report (2018) indicated that for metacognitive instruction to be successful in increasing student attainment, it needs to be explicitly taught to students. The EEF guidance lists both the explicit teaching of metacognition and teachers modelling their thinking to students as two of their seven recommendations for helping schools embed metacognition successfully into students' learning. The report compares teachers to masters who need to show novice learners how to complete a task and describe their own thought processes in planning and completing the task. It proposed a seven-step model that teachers can adapt to explicitly teach metacognitive strategies to students in different year groups and curriculum areas. For a student memorising 15 Lady Macbeth quotations, the teacher could use this model to teach students how to use dual-coded revision cards to memorise information as shown in Figure 3.3.

Figure 3.3 *The EEF's seven-step model for teaching metacognitive strategies (Quigley et al., 2018) exemplified in relation to the process of memorising quotations from Macbeth*

1. The teacher begins by **activating prior knowledge**, such as discussing what the quotations reveal about Lady Macbeth's character and how she changes throughout the play.
2. Next **explicit strategy instruction** is given, where the teacher explains how including a visual representation of each quotation will help them memorise the information and assist with self-quizzing.
3. This is followed by **modelling of learned strategy**, where the teacher uses the first quotation to model how to create a dual-coded revision card.
4. The teacher then checks for **memorisation of learned strategy** by assessing if students have understood the purpose of creating dual-coded revision cards and how to select and create images that relate to each quotation.
5. **Guided practice** follows this, where the teacher models how to create another dual-coded revision card using ideas contributed by the class.
6. During **independent practice**, students complete the remaining dual-coded revision cards.
7. The final step is **structured reflection**, where students are supported to consider how useful the revision cards were and how they could be used for self-quizzing and memorising information in the future.

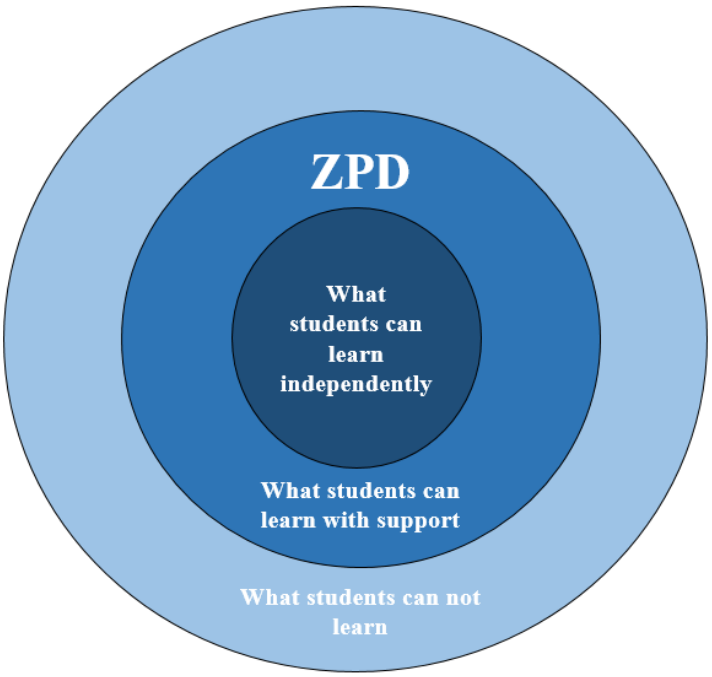
In using this process, teachers are also modelling to students how to use metacognitive strategies to plan, monitor, evaluate and reflect on their learning during the completion of a task. Although these academic processes may be initially effortful, with repeated practice and skilled guidance from teachers they can become fluent and automatic to the point where

students no longer have to consciously think about the process. A similar shift in this move from conscious and effortful processing (supported by teachers) to automatic and fluent processing is mirrored by the process of a child learning to ride a bicycle. Although there are some limitations with this analogy, as riding a bicycle also involves learning complex motor skills and co-ordination, it does also require the child to refine, reflect upon, and develop their approach to become successful. This analogy also demonstrates the symbiotic relationship between metacognitive and self-regulated learning processes. Initially, the child begins with stabilisers, which support them in the initial stages of learning as an expert guides them through how to ride. The thought is effortful and the child has to concentrate in order to stay upright and pedal the bicycle successfully, and remain focussed on their initial goal. With practice, and by adapting different strategies, they become fluent and no longer have to think about how to ride, so the process of riding becomes automatic. As with learning in the classroom, the support (stabiliser) has to be removed for the student to become an independent learner. At this point, the completion of the task becomes more difficult and thus effortful; however, with guidance and practice it eventually becomes fluent and automatic and, like the child on the bicycle, the student has moved from being the beginner to the expert.

This concept is similar to one developed by Vygotsky's work, at the start of the 20th century into how children learn, which proposed that children's learning could be influenced by social contexts (Vygotsky, 1967) . Vygotsky posited that cultural tools, such as speech, were initially used by children to help them negotiate and function socially; however, it was the internalisation of these tools that allowed children to access higher level thinking skills and cognitive development. Central to this theory was a model Vygotsky designed and termed the Zone of Proximal Development (ZPD), which charted the gap between a task the learner could complete independently and one they were unable to complete, as shown in Figure 3.4. In order to negotiate this schism, Vygotsky proposed that learners use the assistance of a More

Knowledgeable Other (such as a more knowledgeable peer or teacher) to help them learn how to complete a task independently.

Figure 3.4 *A model of Vygotsky's Zone of Proximal Development (Vygotsky, 1967)*



Vygotsky proposed that learning occurs as students move through the Zone of Proximal Development. To help students move through this phase of learning, those supporting the student can utilise scaffolding to help them complete the task. How scaffolding relates to Vygotsky's original theoretical work has been contested. For example, Xi and Lantolf (2021) argued that scaffolding was a limiting term in relation to the Zone of Proximal Development and contended that it should not be applied in relation to Vygotsky's work on the ZPD. However, scaffolding has become a ubiquitous term within education, relating generally to any support offered to students during their learning. Its use in an educational construct draws on Ausubel's investigation into expositional teaching methods (1968). In some lessons, scaffolding may be offered as a physical resource as students learn new information, or how to apply a new concept. Examples of scaffolding resources used to support students could include: writing frames; worked models; sentence stems; a list of key words with definitions, or a list of mathematical formula. However, scaffolding can also refer to a more instructional, or

expositional approach in the classroom where teachers model how to complete a task. Scaffolding learning in this way can also involve the use of metacognitive and self-regulatory approaches, where the teacher (or More Knowledgeable Other) explains to the learner the process involved in creating a successful piece of work, including planning, monitoring, evaluating and reflecting on their progress throughout the task. This is similar to the seven-step model advocated by the Educational Endowment Foundation, as shown in Figure 3.3. Placing students in the ZPD should also create enough challenge, or "desirable difficulty" for students to select, review and monitor a range of cognitive strategies to help them, but not so much that they are unable to complete a task.

However, like the beginner on the bicycle, the student will not be able to successfully complete the processes until they are taught how to do it. Didau (2015), posited that students need to be explicitly trained how to think metacognitively, and that they not only need to know how to do this, but they also need to be aware that they need this training. He cited teacher modelling as one of the most effective methods of training students to do this, and argued that it is vital that teachers make their own metacognitive processes explicit to students to help them understand how to use them when engaged in their own work. Didau advocated using modelling and scaffolding, as the most effective strategies because they enable the teacher to explicitly demonstrate metacognitive processes to students. Although Didau termed these methods "unfashionable", the last decade has seen a growing appreciation of how teachers explicitly explaining their thought processes to students can be a powerful tool in help students move from novice to expert. In part, this may be due to recent technological advances in the classroom, such as interactive whiteboards and visualizers, which can be used by teachers to live model and project both their own work and that of their students. Although these were initially prohibitively expensive for some schools, a webcam can now be bought relatively cheaply and have much of the same effect as a more expensive visualizer, making this

technology much more accessible. Used effectively, these can potentially be powerful tools to explicitly track, monitor, discuss and evaluate the thought processes involved in tackling an academic task. However, although technology can make elements of live modelling easier to do, there is also a growing thirst among educators to adopt this approach. At the time of writing, even a cursory internet search on live modelling demonstrates a wealth of teachers using blogs, webinars and social media to share their expertise with other professionals. Furthermore, the EEF's Guidance report on Metacognition and Self-Regulated Learning (2018) also advocated teacher modelling as a way to help students develop both their metacognitive and cognitive skills. As expert learners, teachers are well-placed to pass on not only domain and knowledge to novice learners, but also crucial insights into how a subject-specialist would tackle a task.

The key metacognitive component of this approach involves the teacher articulating their thought process to students as they complete a task. In this way, they can explain to their class not only what information to include in the task and how that information can be applied, but also why they have chosen to tackle a task in a specific way and how that will lead to success. Completing an academic task can involve many constituent parts and novice learners can benefit from understanding how and why these are put together to complete a task. For example, writing a long-form essay in response to the question, "What impression does Shakespeare create of the witches in the opening scene of *Macbeth*?", requires students to select and apply a multitude of different types of knowledge and information when writing a response. During the completion of the task they will have to apply subject specific information, such the role the witches have in the text as well as what they have interpreted from what the witches say and how they behave in the extract. They will also have to decode and demonstrate a lexical understanding of the text and how Shakespeare's word choice influences the reader. In addition, they should show they can select and refer to apt quotations and analyse these quotations in detail using appropriate subject terminology, while also referring to the structure,

literary devices and syntax of the text. Furthermore, they will need to construct an effective argument, or thesis, tracking logically through the text and making connections and evaluating changes in how the witches are presented. Depending on the examination board specification, they may also need to refer explicitly to the social, historical and literary contexts of the play in their response. Throughout the task, they will also be utilising knowledge about spelling, punctuation, grammar, structure and letter formation. During high-stakes, closed book GCSE English literature examinations, students would also have the additional pressure of not knowing the question in advance and being restricted to strict time constraint. With so many different types of knowledge and information required for one task, explicit teacher modelling can also help teachers manage students' cognitive load as it can help them break down the task into more manageable chunks and focus their attention on the most efficient way to complete the task.

Modelling can also be used to demonstrate to learners that making mistakes is a valuable part of the learning process and that failure can lead to success if it is learnt from (Dweck, 2000). Evading failure can be a strong reason for students to avoid work they find challenging, especially if they do not want to appear unsuccessful in front of their peers (Dweck & Reppucci, 1973). Celebrating failure as part of learning can be done through the teacher using a piece of work they have produced, which includes mistakes and needs improvement. Working purposefully in groups, or as a whole class, students can analyse and evaluate the work to improve it and correct mistakes, explaining to the teacher where they have gone wrong and how they can rectify this. Live modelling a piece of work produced by the teacher removes any potential anxiety from an individual of their work being judged pejoratively, while demonstrating the metacognitive processes so that students can apply them to their own work. Ideally, this would help establish a culture where students are comfortable sharing their work with their peers, or the whole class, to help each other improve. When applying this strategy,

teachers may also wish to consider the academic level they are pitching at when writing their model. For example, a GCSE student currently producing work at a GCSE Grade 3 in English literature, would initially benefit more from understanding how an expert learner produced a Grade 4 or 5 response to a task than a Grade 9. This is not to say that teachers should shy away from demonstrating high level models to their students, instead they should consider gradually increasing challenge, as the learner becomes more adept at completing tasks independently and at a higher level. Once the student becomes more adept, the teacher can then gradually remove support, so that the task can be completed independently and without explicit instruction, like the child on the bicycle. Removing scaffolding and fostering student autonomy is an important part of the learning process and it allows students to develop ownership of an intrinsic metacognitive processes, where they ask themselves the questions and deploy the learning behaviours modelled by expert teachers. Ultimately, the aim is for students to develop automaticity in applying the metacognitive process by asking themselves questions and using strategies that help them plan, monitor, evaluate and reflect on their learning. Teacher modelling was a key strategy included in the experimental group lessons, in comparison to the control group, which were given exemplar materials instead. More information about the differences between the two approaches can be found in Section 4.4.5.

As the thirst for the application of cognitive strategies within education continues to grow, an approach that seeks to educate teachers to bridge the gap between the complex theoretical understanding and accurate, practical application in the classroom appears increasingly important. Although there are a growing number of publications specifically aimed at supporting teachers to accurately apply cognitive strategies, such as the EEF Toolkit (2021) and pedagogical handbooks like Dual Coding for Teachers (Caviglioli, 2019) application in the classroom remains variable and is not always effective (Perry et al., 2021). Study 1 seeks to address this issue by creating an intervention rooted both in the theoretical

principles and practical methods of applying cognitive strategies and metacognitive processes in the classroom.

Chapter 4

Study 1: Metacognition and *Macbeth*

4.1 Context

4.1.1 Acceptability Study

An acceptability study was run in advance of the main study with *n*=59 Year 9 students from the participating school in the summer term of 2019. Several adaptations were made to the intervention on the back of the acceptability study and termination of the original study (due to the closure of schools in the Covid-19 pandemic). These included the addition of four instructional videos created by the researcher to model the use of cognitive strategies to students; creating more opportunities for teacher modelling in the metacognitive strand of the intervention; adding slides explaining the theoretical knowledge behind use of cognitive strategies to the metacognitive strand of the intervention ; adding a timer to the 3-minute recall slides, and increasing the frequency of the 3-minute recall activity increased so it was included in every lesson in the metacognitive strand of the intervention lessons. All adaptations made to the original intervention design are described in full in the adaptability study included in Appendix A. These changes are fully also reflected in the intervention described below.

4.1.2 Covid 19 and the closure of schools

The closure of schools in March 2020, in response to the rapid escalation of the Covid-19 pandemic, meant that first attempt at running Study 1 was halted. The initial intervention and data collection for the full study began at the start of the Spring term of 2020 but as only baseline assessments had been completed at this point, and there was no date set for schools to reopen, the initial study was terminated. A further attempt to re-run the study was planned for the spring term of 2021. However, this study did not begin as planned due to the second national closure of English schools in January 2021 during Covid-19 pandemic. The intervention for

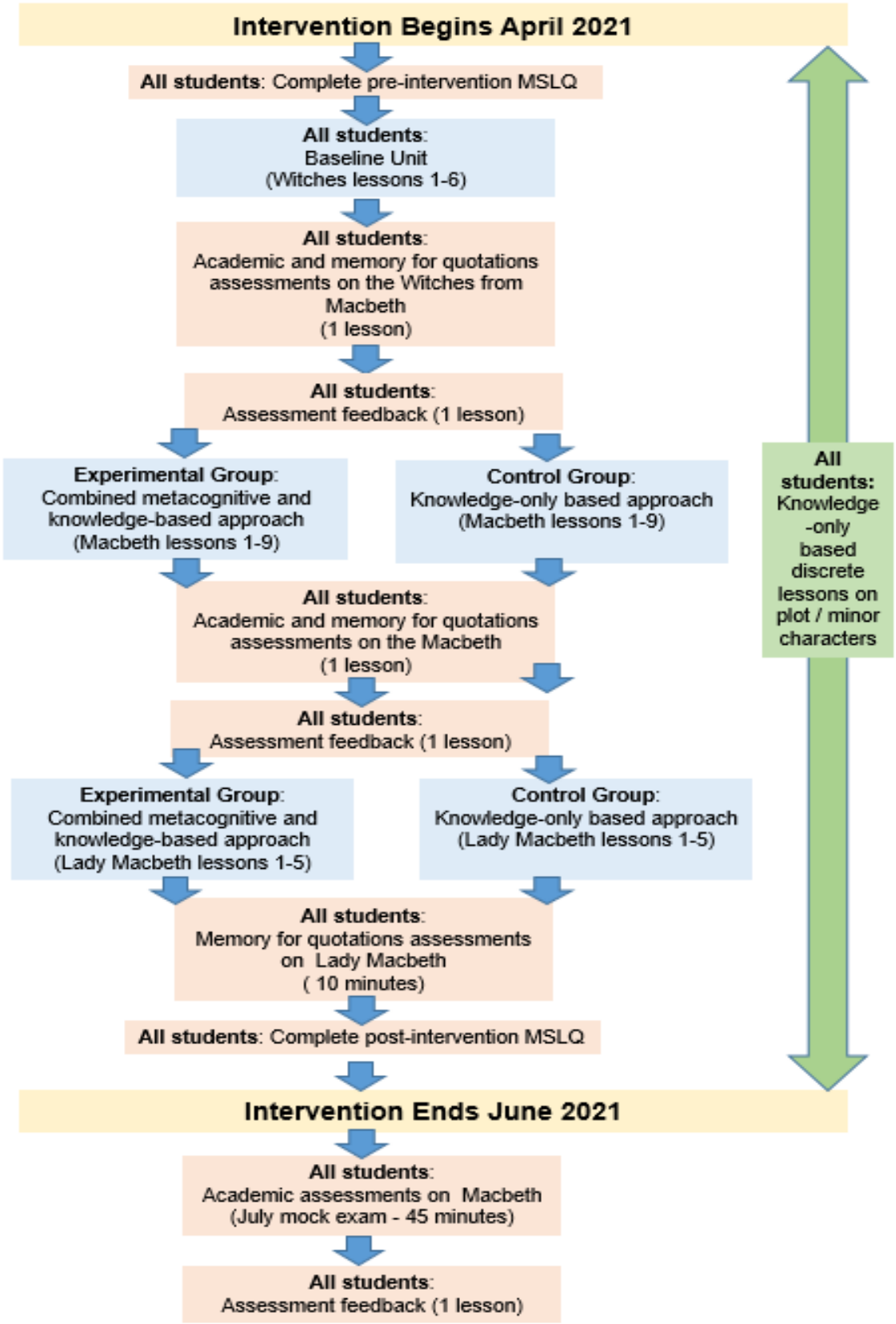
the study was finally run and completed in the summer term of 2021, with a different cohort of students to those recruited for the original study. This was because the participants recruited for the original study had moved into Year 10 and were studying different literature texts in summer 2021 as part of the participating school's GCSE English curriculum plan. Furthermore, these students had completed an online unit of work on *Macbeth* during school closures, which may have compromised the study. Although national school closures delayed the completion of the final study by over a year, it also provided a unique opportunity for the researcher to gain anecdotal acceptability feedback from teachers delivering the terminated intervention. This feedback, and student responses from the student acceptability study, informed the amendments made to the intervention materials, as described in Appendix A.

4.2 Research design

The study design was a cluster randomised controlled trial (RCT), which took place in a single school with randomisation at class-level based on year group side. One half of the year group was randomly allocated to the experimental group by the participating school's Head of the English department who drew the group name out of a hat, and the other half formed the control group. The experimental group undertook a combined metacognitive and subject-knowledge based approach to learning the play, *Macbeth,* via an intervention designed for this study. The other year half formed the control group, which followed a business as usual, subject knowledge-only based approach to learning *Macbeth*. The structure of the study timeline is shown in Figure 4.1. Year side level randomisation was chosen, rather than class randomisation, as students in the participating school were set by attainment and year side allocation reduced the possibility of one group being disproportionally weighted with students of either a higher or lower prior attainment. Although the intervention was designed to meet the needs of all attainment levels, a disproportionate weighting of students by attainment,

would mean that it would not be possible to measure outcomes accurately if the results varied significantly according to prior attainment. The intervention was designed to be delivered at class-level to fit in with the participating school's timetabling requirements, meaning that individual-level randomisation was not feasible. Although year-half randomisation increased the risk of cross-contamination, due to the timetabling of English teachers into both year halves, measures were put into place to reduce this, including teacher training that reinforced the importance of maintaining the integrity of the intervention and the creation of an additional set of knowledge-based lessons. The potential for cross contamination was also considered as part of the process evaluation for this trial (Figure 4.33). The structure and timeline for the summer 2021 study can be seen in Figure 4.1.

Figure 4.**1** *Study structure and timeline*



4.3 Participants

Participants for the completed study were drawn from the Year 9 cohort of a mixed comprehensive secondary school on the Yorkshire coast, and were composed of 13-14-year-old students attending mainstream English lessons (*n*= 156) as shown in Table 4.1.

Table 4.1 *Descriptive statistics for study participants*

	Male	Female	Set 1	Set 2	Set 3	Set 4
Experimental (*n*=78)	45	33	31	28	30	-
Control (*n*=78)	48	30	-[a]	25	22	20

[a] This set was taught by the researcher and consequently removed from the study.

The cohort was divided by the school into two sides (A and B) within which students were then placed into attainment groups. Students in the school are initially set in groups based on prior attainment in Year 6 SAT results and on teacher assessments. Student setting for Year 7 is reviewed at the end of the autumn term and students may move sets (at the start of the spring term) as an outcome of performance in routine testing in core subjects and teacher recommendations, based on attainment in class during the autumn term. Students in each half of the year group are allocated to one of four attainment based sets with higher attaining students placed in Set 1, and students with the lowest attainment scores placed in Set 4. Departments meet at the start of the summer term to further review student settings, and recommendations are made for changes, which are implemented at the start of the new academic year. However, movement is minimal, especially within Key Stage 4, so most students remain in the set they were placed in at the start of Year 7. For English lessons, the A side of the year was made up of four sets and the B side three sets. In order to meet the participating school's timetabling requirements, Set 1 in the A side was timetabled to be taught by the researcher conducting the study; therefore, this group were excluded from the study to

ensure that the fidelity of the results was not compromised by possible researcher bias. The removal of this group was potentially problematic as it meant that no students from the highest attaining set were included in the control group; however, both groups contained an equal number of participants (*n*=78 in each group) and baseline testing was undertaken for all measures, described in Section 4.5, to help identify any significant differences between the two groups.

4.4 Materials

4.4.1 Lesson design

All lessons for the study were designed, written and produced by the researcher and delivered by fully-qualified English teachers within the department, all with at least five years of teaching experience. To support teachers to deliver lessons effectively and increase uniformity, all resources and a detailed PowerPoint presentation were designed and prepared for every lesson. The *Macbeth* unit marked the start of students' English GCSE course, and needed to teach students the knowledge, skills and techniques required to tackle a GCSE-style English literature Shakespeare text. These skills included analysing the writer's use of language, form and structure; referring to meanings and effects; supporting and justifying their responses with direct references to the text, and use of relevant subject terminology. All participants begin learning these skills as part of their Key Stage 3 course starting in Year 7. However, this was the first literature text they had studied specifically in preparation for their GCSE English literature examination, which they were due to sit in the summer term of 2023.

4.4.2 Knowledge-based lesson elements: all participants

All students covered the same subject knowledge of *Macbeth* in all lessons, therefore, a number of elements were included in every lesson slide designed for the study. These elements were

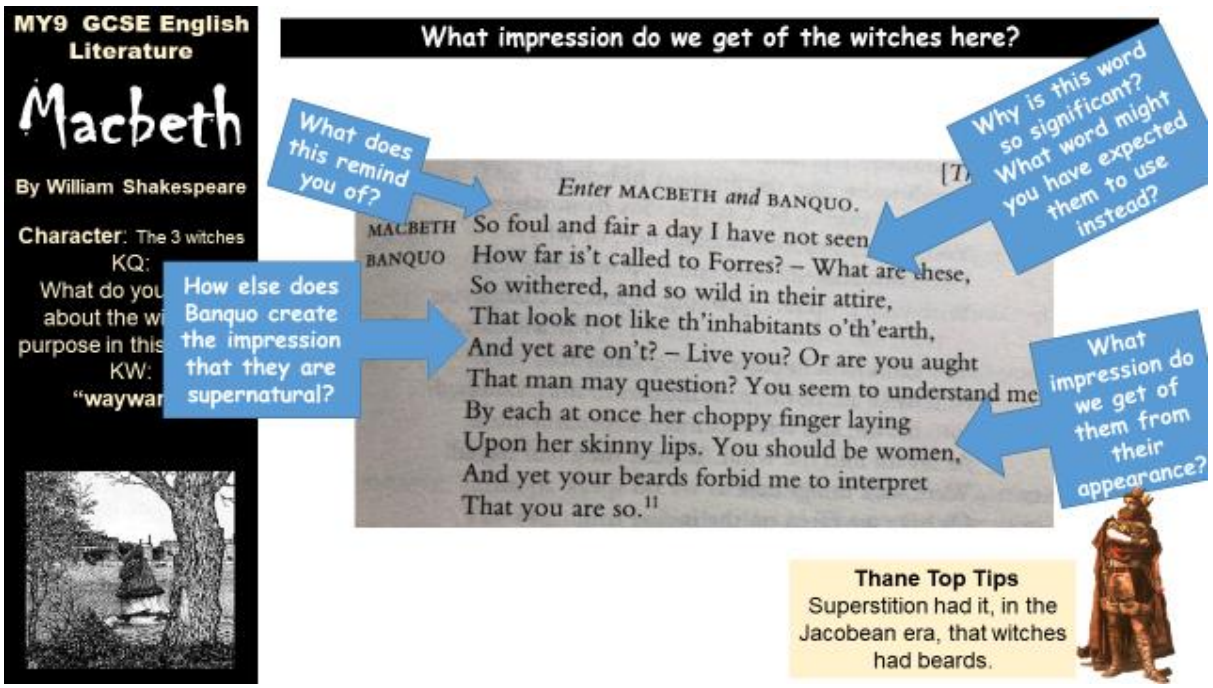
designed to help participants access the play and develop their disciplinary knowledge of the text, and are detailed in the rest of this section. Both cases and controls began every lesson with an Instant Challenge, as shown in Figure 4.2. This was developed as some teachers within the department previously started their Year 7-9 lessons with 10 minutes of independent, silent reading to help increase students' wider reading, and establish a calm, focussed atmosphere for learning. However, 10 minutes of silent reading at the start of each lesson, for the duration of the intervention, would total 240 minutes and would result in a reduction of 4 hours teaching time to the study. To address this, all lessons, began with a 5 to 10-minute Instant Challenge, which allowed students to work independently and consolidate prior learning or prepare for future learning. The activation of prior knowledge is the first of the seven-step approach advocated by the Educational Endowment Foundation's guidance report to educations on to how teach metacognitive strategies (Quigley et al., 2018). Instant Challenges included summing up information about characters, themes and events. An example of a slide containing an Instant Challenge can be found in Figure 4.2.

Figure 4. 2 *Lesson slide with an Instant Challenge*

To further increase consistency in the way the material was delivered to students, and help ensure that all participants were analysing the main points in each section of the text, questions were placed on the slides and around the extracts from the text as a focus for discussion. Teachers were able to explore other questions and ideas prompted by the task, or extract, but they had to ensure students discussed and made notes on the set questions included in the slides. Additional pieces of information to help students unpick extracts from the play were also placed in the bottom of relevant slides for students to access when studying the extracts in class. These sections were labelled Thane Top Tips and Glossaries for Thanes (Macbeth is the Thane of Glamis at the start of the play). Glossaries were included to help students decode the text and manage their cognitive load, so that their working memory did not become overwhelmed. Contextual information was also incorporated into the slides to help learners understand the historical, social and literary background to the play and specific extracts studied as part of the course. In part, the additional material was designed to provide students with richer understanding of the play and direct their attention towards the information they needed to know to be able to understand the text more fully and work towards completing the assessment task successfully. However, it also allowed for higher prior attainders to access higher levels of challenge by creating more opportunities for students to make deeper connections across the text. For example, the contextual knowledge given about superstitions relating to witches in the Jacobean era (as shown on the Thane Top Tip in Figure 4.3) was included to help learners understand why Banquo, Macbeth (and a Jacobean audience) would quickly suspect that the three figures were witches. Yet, the inclusion of this contextual information, could also explain why Banquo appeared unable to "interpret" the figures as women. Ostensibly, this could be because their beards signified masculinity, but it could also suggest a link to the supernatural. This helps students connect this understanding to why

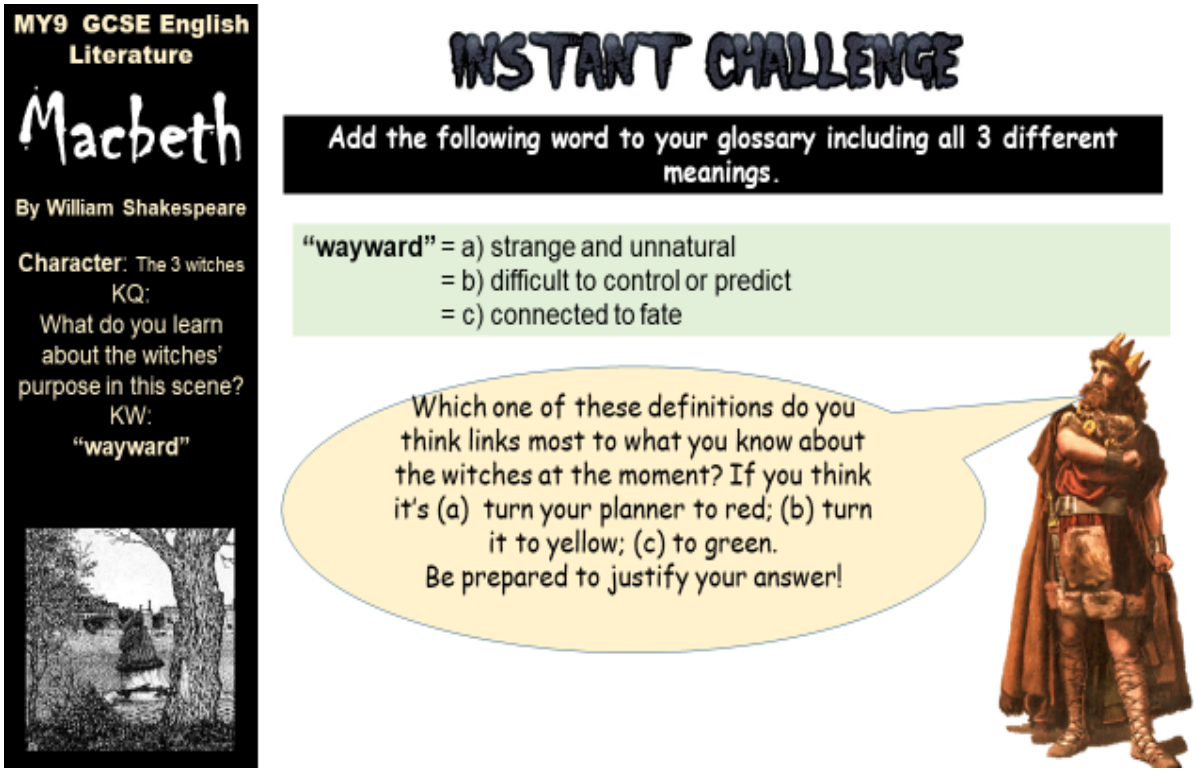
Banquo may have referred to the witches as "what", rather than "who" at the start of the extract. The beards do not just "forbid" Banquo from interpreting the witches' gender, they also lead him to question their humanity, both foreshadowing and recalling their supernatural knowledge. In additional to enriching students' disciplinary knowledge, the inclusion of contextual and lexical information within the lesson slides was also intended to facilitate students in being exposed to the same disciplinary content, irrespective of their class teacher's experience in teaching the text. The purpose of this was to mitigate against any potential variation in levels of subject knowledge that different teachers delivering the lesson may have about the text. Although all teachers taking part in the study were familiar with the play and had taught it before, this approach was adopted to help ensure that all participating students had access to the same disciplinary content. A further consideration was to make the intervention potentially scalable in other schools that so that it could be delivered by less experienced teachers, or those with less knowledge of the text.

Figure 4. 3 *A lesson slide with questions as prompts and a Thane Top Tip*



A side bar was also created for each slide, in lessons for all students, that contained a key question (KQ) and a key word (KW) relating to the lesson. Each lesson was designed with its own key question, which was also the learning objective for the lesson. This was included to provide an opportunity for both students and teachers to reflect on the objectives at different points at the lesson, with the aim that all students would be able to answer the question, whatever their attainment level, by the end of the lesson. Examples of key questions from the first seven lessons included, "Why do you think Shakespeare chose to open his play with the witches?" (when studying Act 1, Scene 1) and, "What do you learn about the purpose of the witches in this scene?" (Act 1, Scene 3). Each lesson also identified one or two key words that were related directly to subject content of the lesson and the extracts being analysed. These were included to help students articulate themselves precisely; develop lexical understanding; build lexical connections across the text, and analyse language in greater depth. Key words were predicated on Tier 2 (cross-curricular academic) vocabulary, such as wayward and vindictive, and Tier 3 (subject-specific vocabulary), such as pathetic fallacy. This key vocabulary was also revisited in subsequent lessons to help students embed it in their long-term memory and use it accurately in a number of contexts. For example, vindictive was used as the key word in a lesson about the witches, to help students understand that part of the reason these characters were so dangerous was that they held an unrelenting thirst for revenge on anyone who had wronged them for even the smallest of slights and this was often extended to the families of those who had upset them. It also meant that, when they were describing the witches in subsequent lessons and assessments, they could be more precise when describing their characteristics. Where appropriate, students were also taught different meanings of key words to help them explore the notion that language can be ambiguous, or interpreted in different ways depending on context. One example of this was the inclusion of wayward as a key word (as shown in Figure 4.4).

Figure 4.4 *A lesson slide including a sidebar with a key question and a key word*

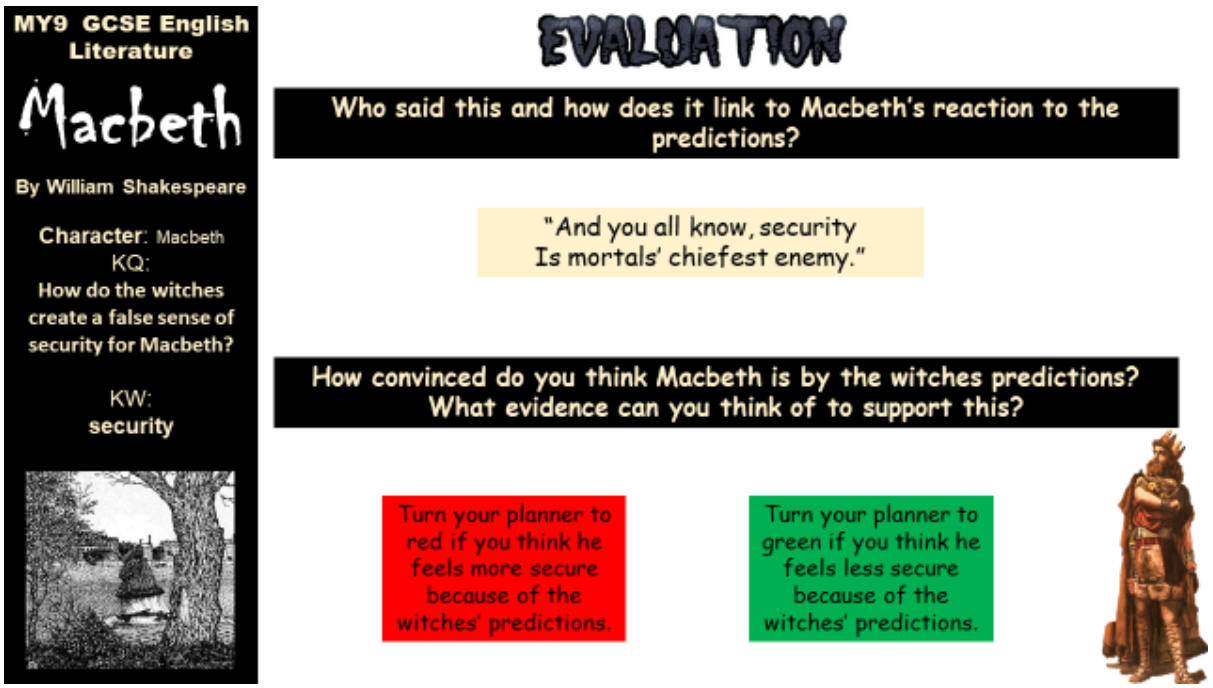


All students were initially directed to consider how the different interpretations may relate to the witches. However, later in the unit, they further considered how the different meanings may relate to Macbeth, when Hecate referred to him as a "wayward son" and the different ways this could connect him to the witches. Students added key words, and other related vocabulary, to a glossary at the front of their books to make it easier for them to locate and refer to the words in subsequent lessons.

Finally, each lesson ended with an Evaluation designed to give students an opportunity to reflect upon and consolidate their learning. As lessons were densely packed, it also meant that if a teacher needed to take more than 60 minutes to deliver a single lesson, the sections between each unit of learning (which each began with an Instant Challenge and ended with an Evaluation) could be clearly identified to both students and teachers. Some Evaluations explicitly referred to the KQ as a focal point for discussion and reflections, such as "Why does Macbeth's power become fragile once he becomes king?" For this task, students had to work in pairs to list three reasons, which they could justify with evidence from the text, before

sharing these ideas with the class. Other Evaluation tasks included comprehension questions; creating flow charts of events or character thoughts, and responding to hypothetical questions such as, "How would the play be different if Duncan had woken up when Macbeth was trying to murder him?" An example of an Evaluation slide can be seen in Figure 4.5.

Figure 4.5 *Lesson slide that includes an Evaluation*

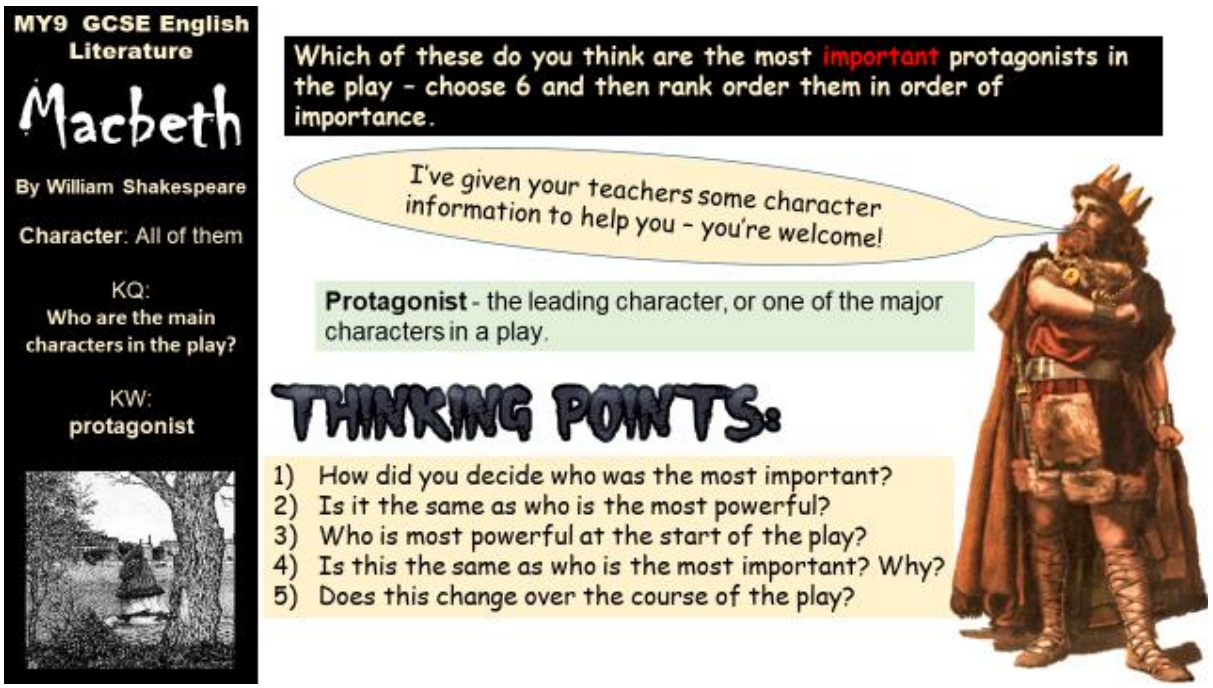


4.4.3 Pre-intervention baseline lessons: all participants

Before the experimental group began the intervention lessons, all Year 9 learners followed the same lessons for the initial six lessons of the study (as shown in Figure 4.1). The purpose of this was to prepare students for their baseline assessments before the groups were exposed to different approaches to teaching the text. All students began with an introductory lesson aimed at securing their understanding of the main characters and sequence of events in the play. Tasks included rank ordering characters in order of importance and developing character summary cards for the main characters they would encounter during the lesson, such as Macbeth, Lady

Macbeth and Banquo. This was designed to give all students an overall understanding of the play, which they could use as framework to build a schema of knowledge about the play and its characters.

Figure 4.6 *Lesson slide (from baseline lesson 1) teaching students about different characters in the play*



During the six baseline lessons, students were also taught the subject knowledge and success criteria required to tackle the baseline assessment, "What impression does Shakespeare create of The Witches in this extract of *Macbeth*?" Prior to the baseline academic assessment (which took place in Lesson 7), Lessons 2 to 5 focussed on analysing the four main scenes that the witches appeared in, during the play (Act 1, Scenes 1 and 3; Act 3, Scene 5 and Act 4 Scene 1). Lesson 6 prepared students for the baseline assessment by teaching them seven top tips for tackling the question; explaining the success criteria, and giving them an exemplar paragraph of how to apply the top tips to their writing.

Figure 4.7 *Lesson slide with Top Tips for assessment preparation*

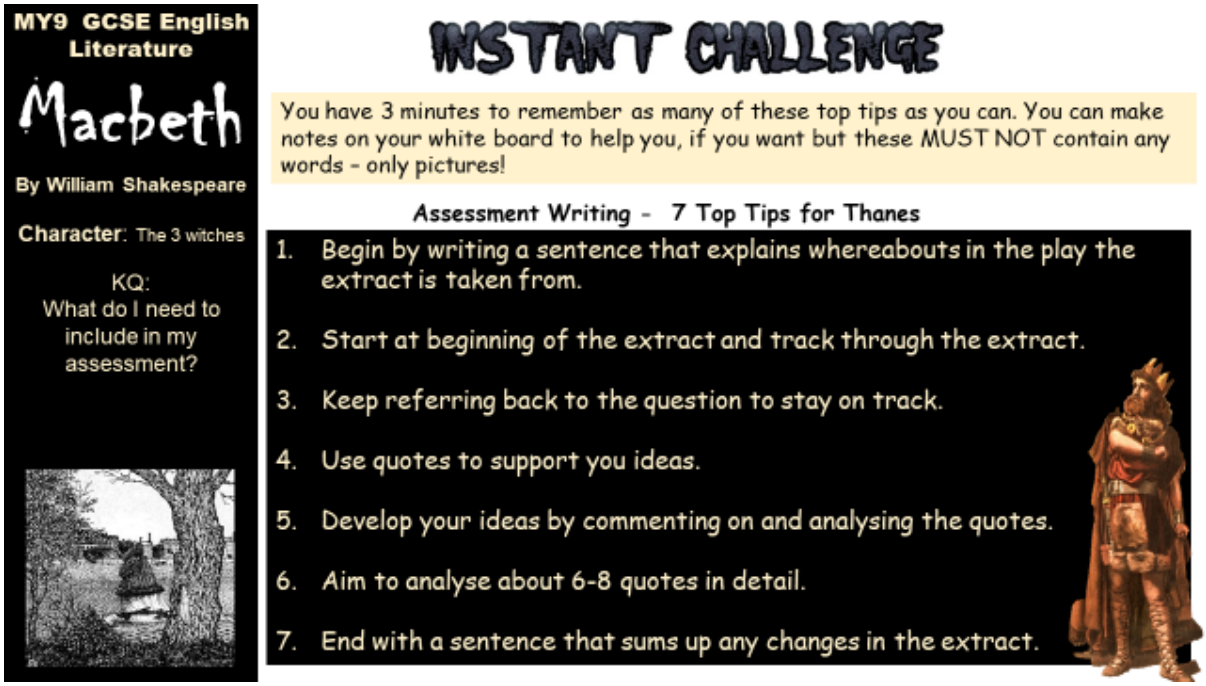


Figure 4.8 *Lesson slide with success criteria for assessment preparation*

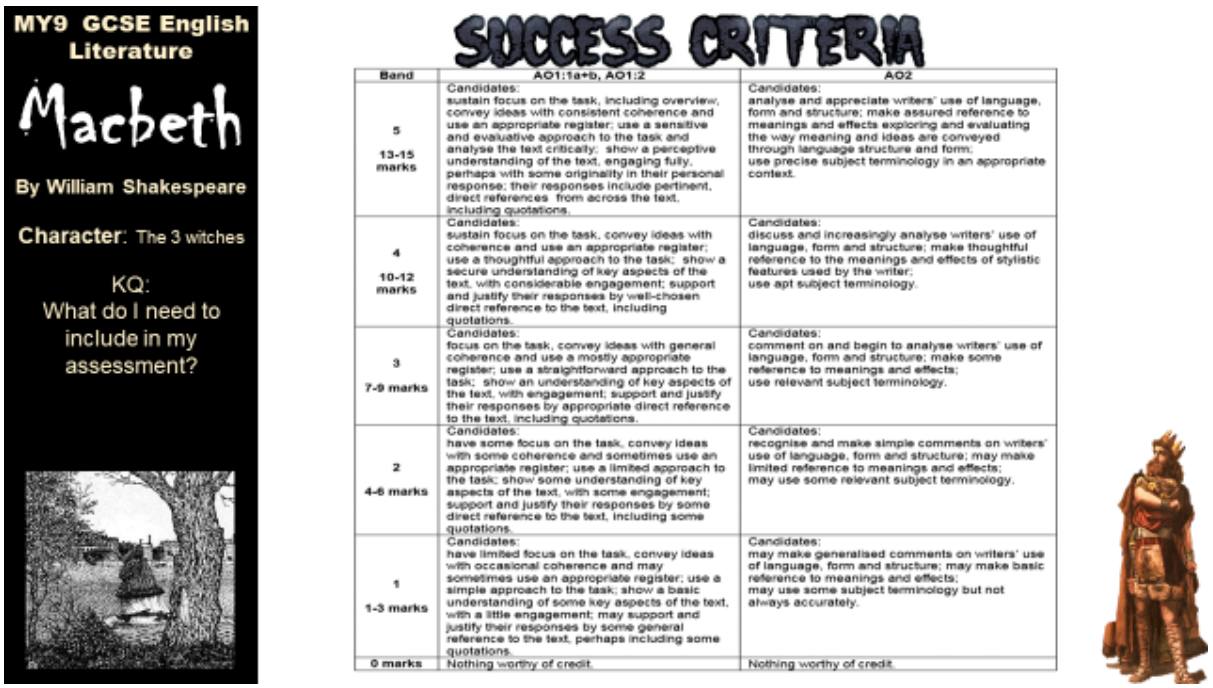
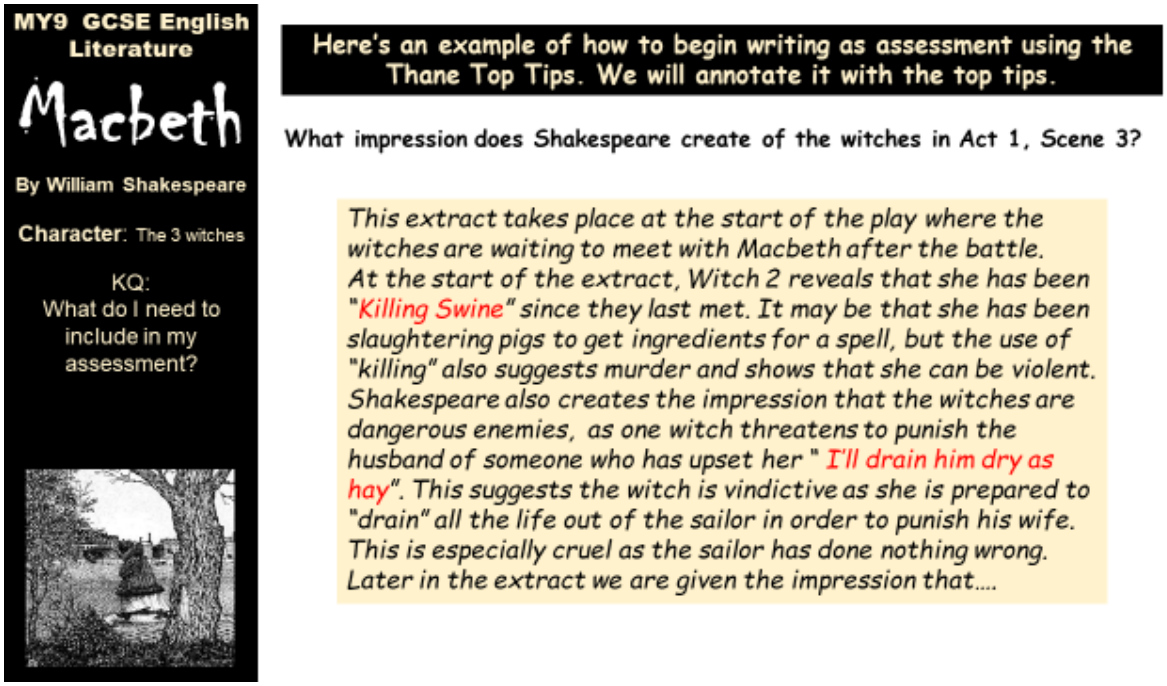


Figure 4.9 *Lesson slide with an exemplar paragraph for assessment preparation*



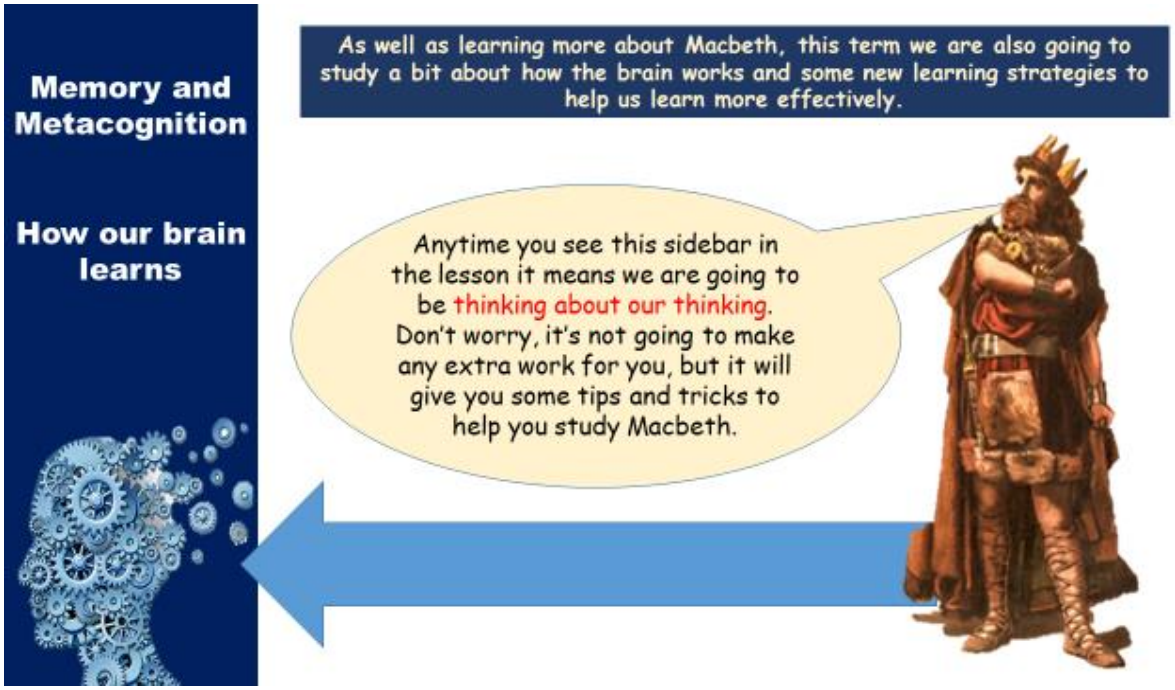
During Lesson 7, all students were given the assessment task title, "What impression does Shakespeare create of the witches in this extract from *Macbeth*?" However, although students knew the assessment would focus on an extract they had studied in class, only the researcher knew which extract had been set and teachers (who were also blind to which extract had been set) collected the assessment task from the researcher on the day their class took the baseline test. This was done to both to help maintain the integrity of assessment standardisation (so that teachers were unable to teach to the test, or prepare their students unfairly) and also to scaffold students towards replicating the conditions of their Year 11 terminal GCSE assessments, for *Macbeth*, where they would need to analyse an unseen extract from the play. The assessment was completed in Lesson 7 (as shown in Figure 4.1).

4.4.4 The Intervention: experimental group only

Upon completion of all seven baseline lessons, experimental participants then followed the combined approach to learning *Macbeth*. This meant that in addition to the subject-based lesson content, followed by the control group, they were given additional materials and content designed to explicitly teach them a metacognitive approach to learning the text. The intervention lessons were divided into two blocks, as shown in Figure 4.1. The first block consisted of nine lessons and focussed on learning about the character Macbeth. Students then sat an unseen extract assessment based on their learning in the nine Macbeth lessons and were given assessment feedback (see Section 4.5.2 for more details on assessments and assessment feedback). Following this, students were due to complete a further nine lessons, which focussed on the character of Lady Macbeth before sitting an assessment based on their learning of this character. However, most groups only reached up to Lesson 5 in the Lady Macbeth lessons before the date of the final assessment and so the intervention lessons were curtailed after Lesson 5, as shown in Figure 4.1. For more details about changes to the final assessment as a result of this see Section 4.4.

Any parts of the lesson which included the additional metacognitive content were clearly signposted to both the teacher and student with the side bar in the PowerPoint, which was different to that used for subject-knowledge content to make it clearly identifiable. This sidebar colour (blue) and image remained the same for each metacognitive slide to create consistency across the presentation of the slides and make them more easily recognisable. An example of a slide with a blue, metacognition sidebar can be seen in Figure 4.10.

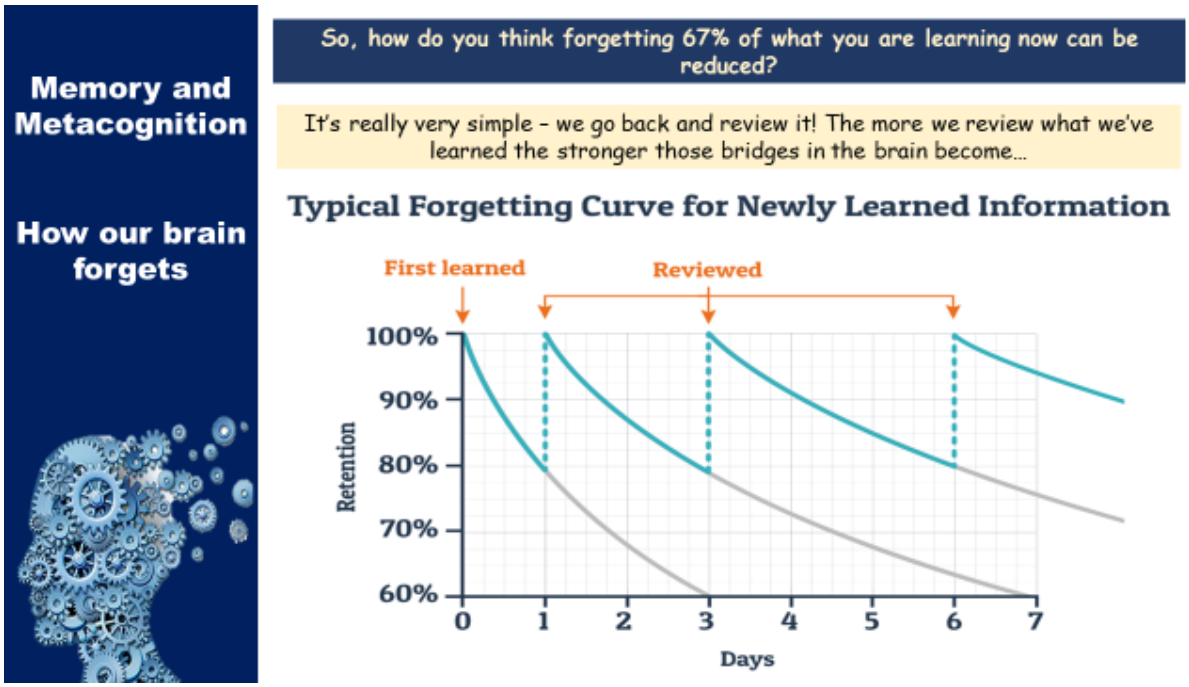
Figure 4.10 *Lesson slide with a metacognition sidebar*



Lesson 1 of the combined approach began with a 4-minute video of Sir Robert Winston demonstrating how the brain learns and remembers information through synapses and neural pathways, taken from the BBC television series, The Human Mind (Cecil, 2009). This was included to give students an understanding of how the cognitive strategies they would be using, such as spaced learning and dual coding, could be used to help strengthen neural pathways in the brain and improve recall. Students were then shown a list of the strategies they would be shown how to use, such as quizzing and repeated low-stakes testing before moving on to complete the knowledge-based section of the lesson. The rest of this lesson followed the knowledge-only based content, with students analysing how Macbeth was presented in Act 1, Scene 2 of the play. Lessons 1-9 for both control and experimental groups, following completion of the baseline lessons, were designed to foster students' understanding of the character Macbeth. Lessons worked chronologically through the text, with a focus on how he was portrayed in some of the key scenes he appeared in.

The beginning of the second lesson for the experimental group was designed to teach students the role that forgetting can play in memory and introduce them to the 3-minute recall strategy. Slides were included that explained Ebbinghaus' Forgetting Curve (Ebbinghaus, 1885) and how it could be applied to the material they learnt in their *Macbeth* lessons and to what they had learned about how the brain works, in the previous lesson. The Forgetting Curve was based on Ebbinghaus' research into memory (1885) and posits a model for the rate at which memory deteriorates over time (Figure 4.11).

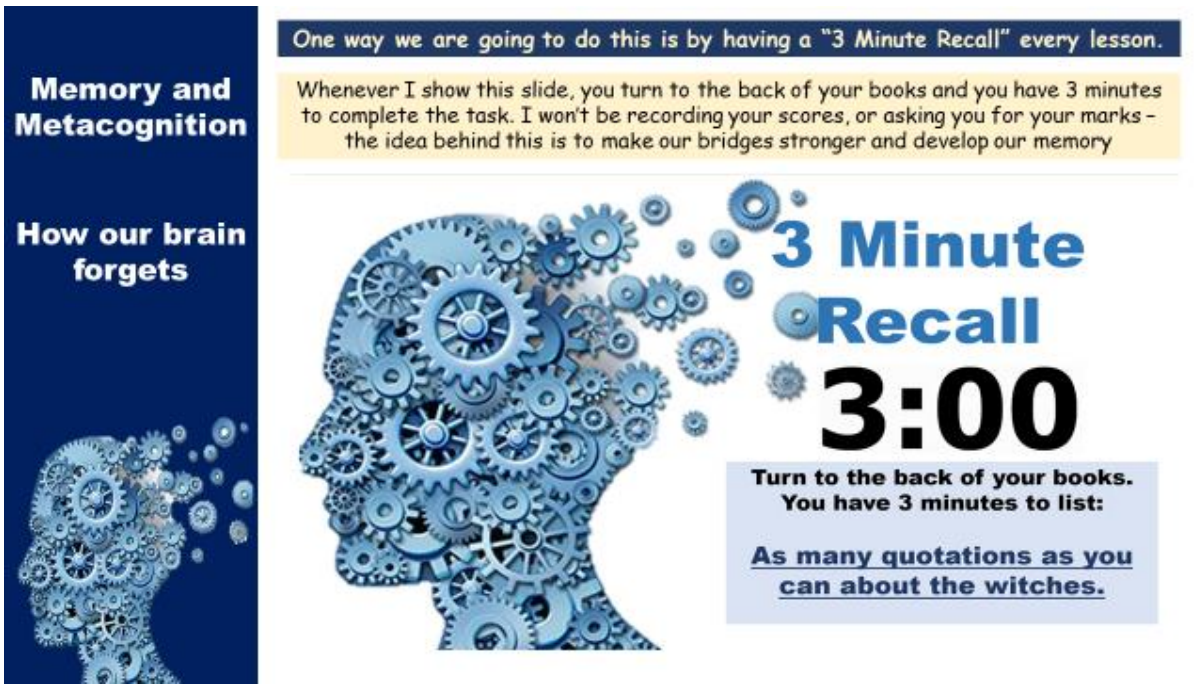
Figure 4.11 *Lesson slide showing Ebbinhaus' Forgetting Curve (Ebbinghaus, 1885)*



Students were then introduced to the 3-minute recall, their first strategy for learning quotations and information about the text and characters (Figure 4.12). This cognitive strategy was based on the theory of retrieval practice and designed so that part of every lesson was spent developing students' memory recall through regular low-stakes retrieval practice (Sotola & Crede, 2021; Webb, 2019). During the 3-minute recall students had to turn to the back of their

exercise books and list as many responses as they as were able to remember to the instruction given on the PowerPoint slide, until the timer finished (as shown in Figure 4.12). Instructions included: list as many quotations as you can remember about the witches; list as many adjectives as you can to describe Macbeth at the start of the play, and list as many things as you can remember about when Banquo and Macbeth met the witches.

Figure 4.12 *Lesson slide explaining to students how to complete a 3-minute recall task*

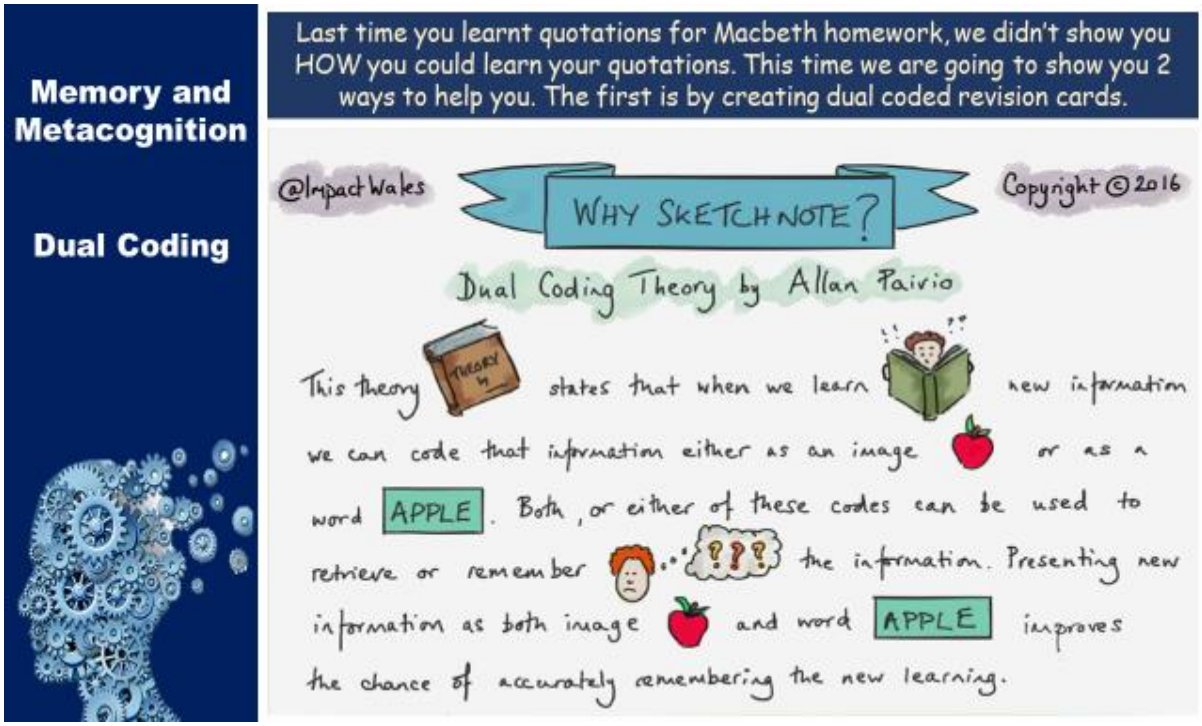


A 3-minute recall was then included in all subsequent lessons for the experimental group (the control group were not shown this strategy, nor was it included in their lessons). The purpose of this strategy was to increase students' recall of quotations by exposing them to frequent, spaced retrieval tasks, which were designed to strengthen and embed this information in students' long-term memory. In doing so, the tests were designed to be both a method of learning as well as recall (Perry et al., 2021). The materials also clearly explained to students why they needed to know a variety of quotations off by heart (the GCSE English literature examination for Shakespeare is closed book), so they also understood the purpose of the

learning. As results from the 3-minute recall strategy did not form part of the measures for this study, they were not recorded and the number of quotations students remembered were not shared with either the teacher, or the rest of the class. Moreover, the structuring of this task as a low-stakes quiz was also designed to help minimise student academic anxiety, where they could reflect on their learning, rather than be assessed. To cultivate a culture of reflection, teachers were guided to use a number of low-stakes methods to obtain feedback from students. For example, teachers could focus on the number of quotations that were remembered as a class. This could be done by rotating through the class asking students to read out a quotation they remembered. If a student had run out of quotations, when it was their turn, they could simply say, "pass" to indicate that their quotations had already been used. The purpose of this low-stakes approach was also to make students more aware of, and responsible for, the number of quotations they knew, as well as regularly exposing them to as many short quotations from the text as possible that they could learn from.

Apart from the inclusion of a 3-minute recall task, Lesson 3 followed the same content as the subject knowledge-only based approach, to give students time to familiarise themselves with this strategy before learning a new one. At the start of Lesson 4, students in both the case and control groups were given a list of 15 quotations to learn for homework (see Section 4.5 for more details about these measures). However, whereas students following the knowledge-only based approach were given no additional support in how to learn these quotations, students following the combined intervention were taught about dual-coding and how to make dual-coded cards using the quotations they had been given for homework. Firstly students were shown a sketch note (Impact, 2016) that briefly explained the concept of Dual Coding Theory (Clark & Paivio, 1991), as shown in Figure 4.13.

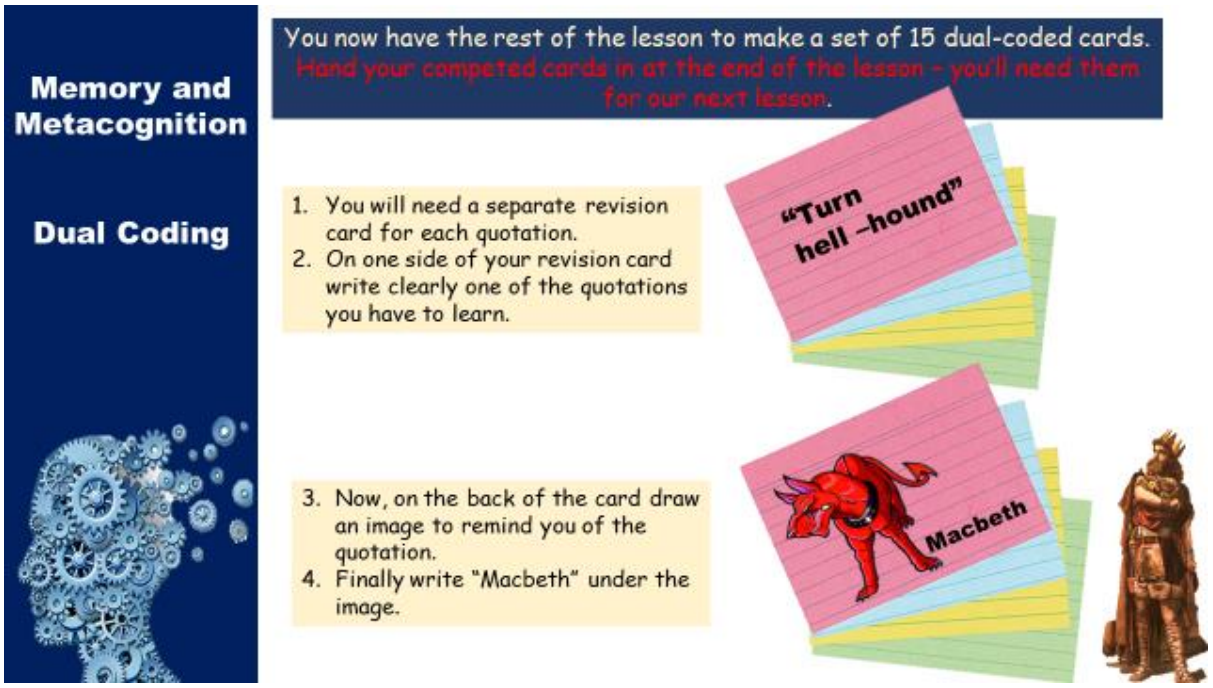
Figure 4.13 *Lesson slide with a sketchnote explaining Dual Coding Theory (Clark & Paivio, 1991)*



Students were then shown how to create dual-coded revision cards for the 15 quotations they had to learn for homework, which involved writing one of the quotations on each piece of card and on the other side drawing an image that related to the quotations, as exemplified in Figure 4.14. This could be a literal image, such as drawing a brain full of scorpions to represent "O full of scorpions is my mind", or symbolic, such as a lion to represent "Brave Macbeth – well he deserves that name." The important factor was that the image would link to the quotation in some way to help the student remember it. Although teachers delivering the intervention had been taught how to model creating dual-coded quotation cards, a video was created, which showed the researcher explicitly modelling how to create these cards. The video also showcased cards and quotations created by students in the acceptability study to exemplify resulting cards made using this approach (for information on the acceptability study, see Appendix A). All experimental students watched this information video to help increase consistency across classes and a slide with instructions was put on the whiteboard for them to

refer to during the lesson. Students were given the rest of the lesson to complete the cards and although each student had to create their own set of cards (so that they could use them to independently learn quotations) they were allowed to collaborate on ideas for images and ask for teacher support.

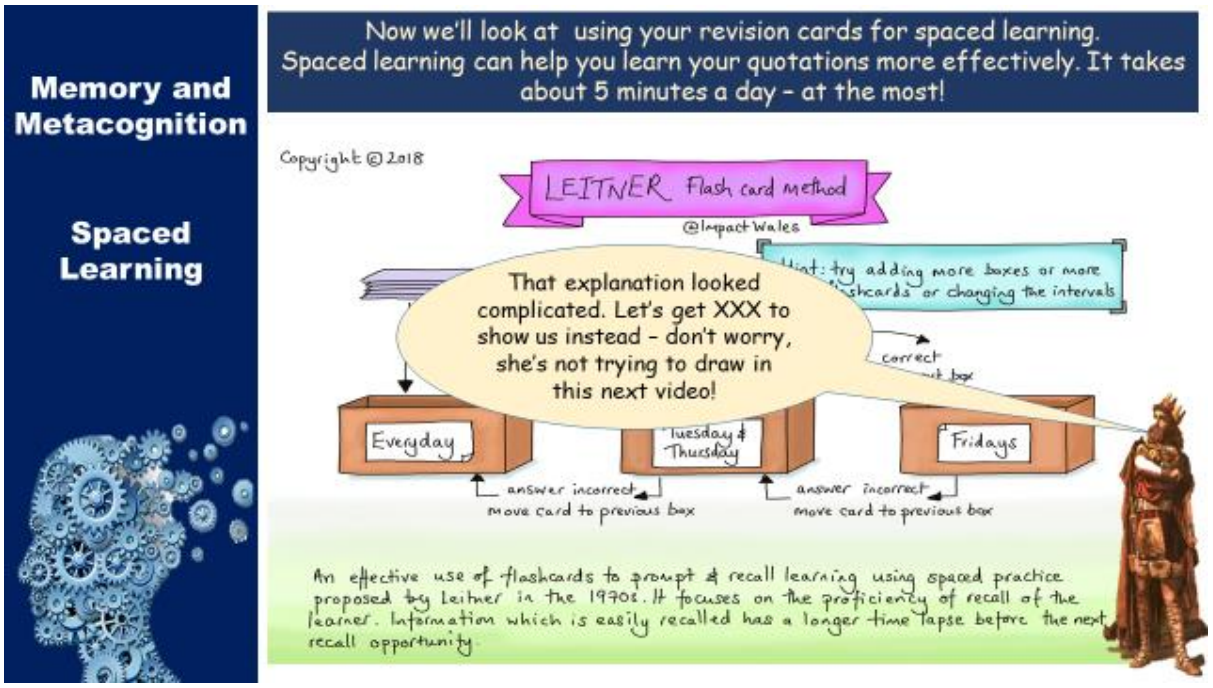
Figure 4.14 *Lesson slide with instructions for dual coded revision cards*



In addition to showing students how to create dual-coded quotation cards, the lessons were also designed to demonstrate to students in the experimental group how to use the cards in tandem with spaced learning as a revision strategy. Consequently, the start of Lesson 5 was used to briefly explain to students both spaced learning and how they could use spaced learning to help them revise with their dual-coded quotation cards. The lesson began with students being shown the image of Ebbinghaus' Forgetting Curve again to remind them that frequently reviewing information could help them remember information and that this theory could be applied to their own learning of quotations. Participants were then shown a sketch note (Impact, 2018) which simply explained the Leitner system (Leitner, 1972) for using spaced

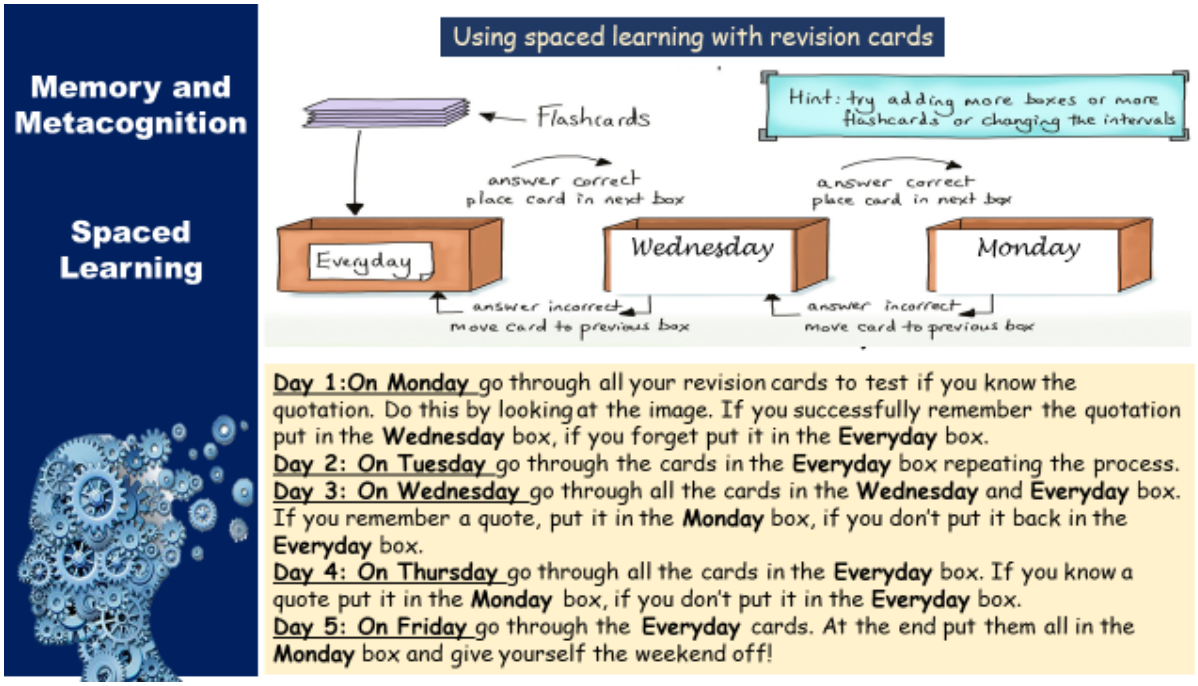
learning with flashcards (Logan et al., 2012; Mubarak & Smith, 2008), as shown in Figure 4.15.

Figure 4.15 *Lesson slide with a sketchnote for the Leitner system (Leitner, 1972)*



Students then watched a video, created by the researcher, which modelled how students could use this method at home and make it part of their daily routine. This involved them reviewing the images on their cards to see if they could remember the quotation on the other side. Instructions for what to do, depending on if they had successfully remembered the quotation or not were also placed on the board (see Figure 4.16) and copies of this slide given for them to stick into to their planners to remind them how to follow the method when working independently.

Figure 4.16 *Lesson slide with instructions for using the Leitner system for home learning*

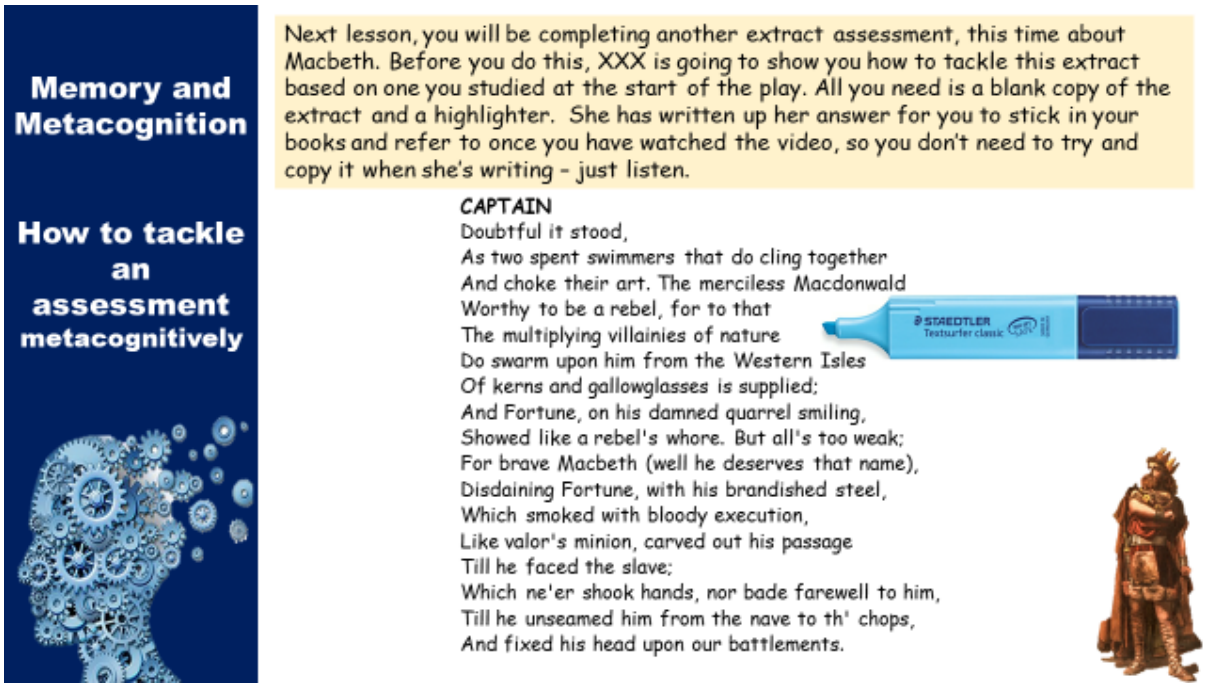


Finally, participants were given 5 minutes to work in pairs to practice this method and test each other on how well they could remember their quotations before being instructed to learn their quotation in this way for homework. As with the control group, they were given one week to learn the quotations before being assessed on how well they could remember them in controlled conditions. The rest of the lesson, and the subsequent lesson, followed the business-as-usual knowledge-only based approach, apart from the inclusion of the 3-minute recall tasks.

During Lesson 7, students in both experimental and control groups were given the first two paragraphs of an example essay, written by the researcher, answering the question, "What impression does Shakespeare create of Macbeth in this extract from Act 1, Scene 2?" However, whereas students in the control group were just given the essay as an example to discuss and analyse, participants from the experimental group were also shown a video, created by the researcher, that modelled how the example essay was written and explained which strategies they used to create it. This was done to help students understand the through processes of how an expert learner, or More Knowledgeable Other (Vygotsky, 1967), would approach the task. The process was broken down into two parts each with a separate video. First, students were

shown a video, created by the researcher, that modelled how to skim read through the extract and select quotations that would help them answer the question.

Figure 4.17 *Lesson slide with an explanation for watching to a model response (experimental group)*



This video demonstrated the researcher tracking through the extract to choose the first two relevant quotations, while explaining why those quotations had been chosen and how they specifically related to the question. Furthermore, the video explained that tracking and highlighting the quotations was a strategy that would make it easier for students to quickly identify the quotations they needed to support and develop their ideas when answering the question and to write an answer that tracked logically through the text. Participants were then given 3 minutes to practice this strategy by skim reading through the extract independently to select and highlight at least 4 further quotations that would help them answer the essay question. The class teacher then chose one student's highlighted extract from the class to model under the visualizer and then provided verbal feedback as the class discussed the rest of the extract and if / how the student's selected quotations would support them in writing an accurate

response to the question, while correcting and unpicking any misconceptions that may have occurred.

After this, a second video was shown, which presented the researcher writing up a model answer to the question up until the end of the 14th line of the extract. Throughout this demonstration, the researcher explicitly explained what they were writing, and why they were writing in that way, by relating their response to both the success criteria (Appendix B1,) and the writing Top Tips (Figure 4.3). To help students focus on this process, they were instructed not to copy down the model answer during the video and that this would be provided for them to refer to. Although students in the control group had also been given the same model answer, success criteria and top tips, they had not been shown the process of writing a response and instead annotated the model answer with any of the relevant top tips that they could identify as having been used. Both groups then ended the lesson by trying to write a paragraph answering the question, based on the last three lines of the extract, which had not been included in the researcher's model answer. In the subsequent lesson, all groups completed an assessment based on an extract they had already studied (see Section 4.4 for further details).

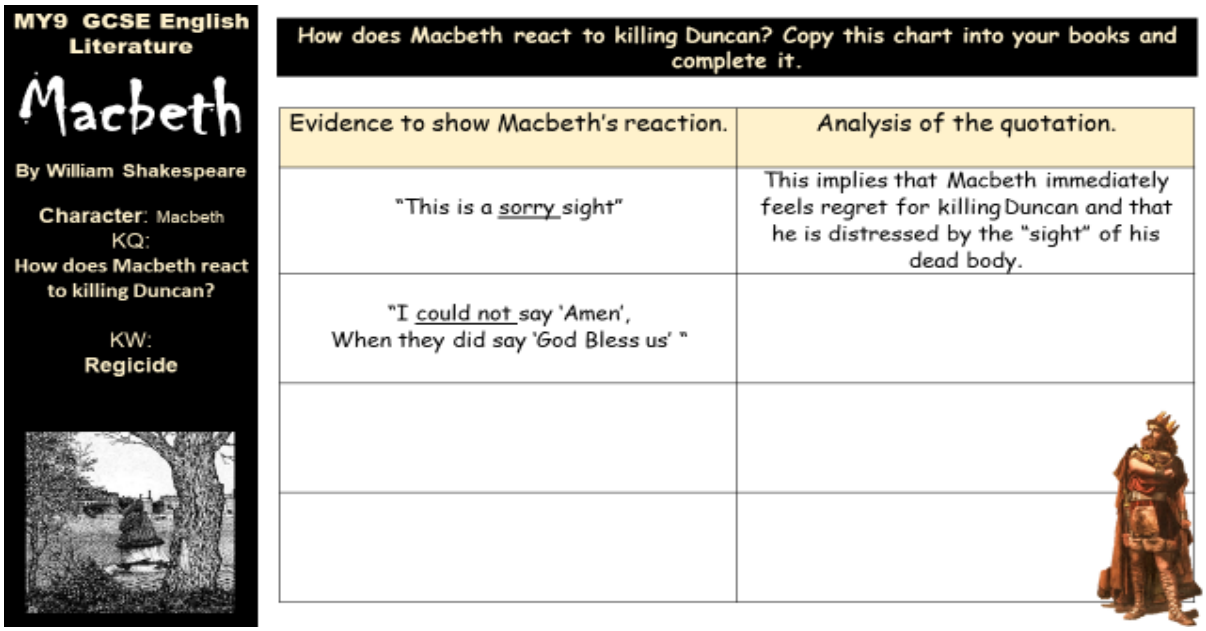
During the remaining seven lessons (two further lessons on Macbeth and five on Lady Macbeth) experimental students were introduced to no further new cognitive or metacognitive strategies to use. This was to allow students to focus on becoming more accomplished in the use of the strategies and the metacognitive and self-regulatory processes. As students developed in confidence, scaffolding (such as the explicit teacher modelling presented in the expositional videos) was gradually faded out and students were given less explicit instructions to move them towards working independently on tasks and developing from novice to expert in selecting and applying cognitive and metacognitive strategies when appropriate. Each lesson continued to include a 3-minute recall to strengthen students' retrieval skills. Students were also instructed to make dual-coded quotation cards and use the Leitner system for learning a

further 15 quotations about Lady Macbeth. However, students were given no further time in lessons to complete these tasks and were expected to work on them independently without additional teacher support.

4.4.5 Knowledge-only based lessons: control group

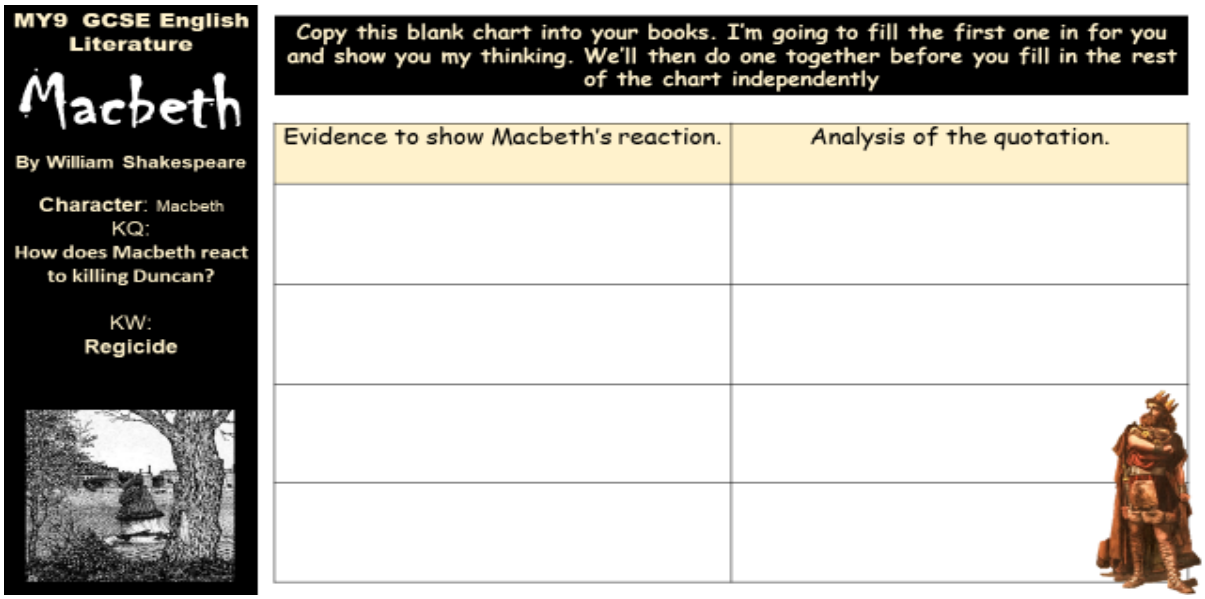
Subsequent to the baseline lessons, students in the control group worked through the knowledge-only based lessons, which were designed to foster students' understanding of the characters Macbeth and Lady Macbeth through the study of different extracts and scenes from the play. Students in the control group studied identical extracts and parts of the play to those in the experimental group and used the same PowerPoint slides and resources for the subject knowledge-based parts of the intervention. However, they were not taught any of strategies, or given any explicit modelling of how to tackle tasks that were used in the combined approach and signposted on the metacognitive sidebars. Instead, students were given information (as with the model essay response) but did not discuss the process. For example, the slide in Figure 3.18 shows a table where students were given an example of a relevant quotation, which reveals Macbeth's reaction to killing Duncan, as well as an analysis of the quotation. They had to use these examples to help them work out how to independently complete the rest of the table.

Figure 4.18 *Lesson slide with information included in the table for the knowledge-only based approach*



This contrasts to the combined approach, where no information was included on the table (see Figure 4.19), but the teacher explicitly modelled how they identified which quotation to select and then how to analyse the quotation as an expert before students worked independently to complete the rest of the table.

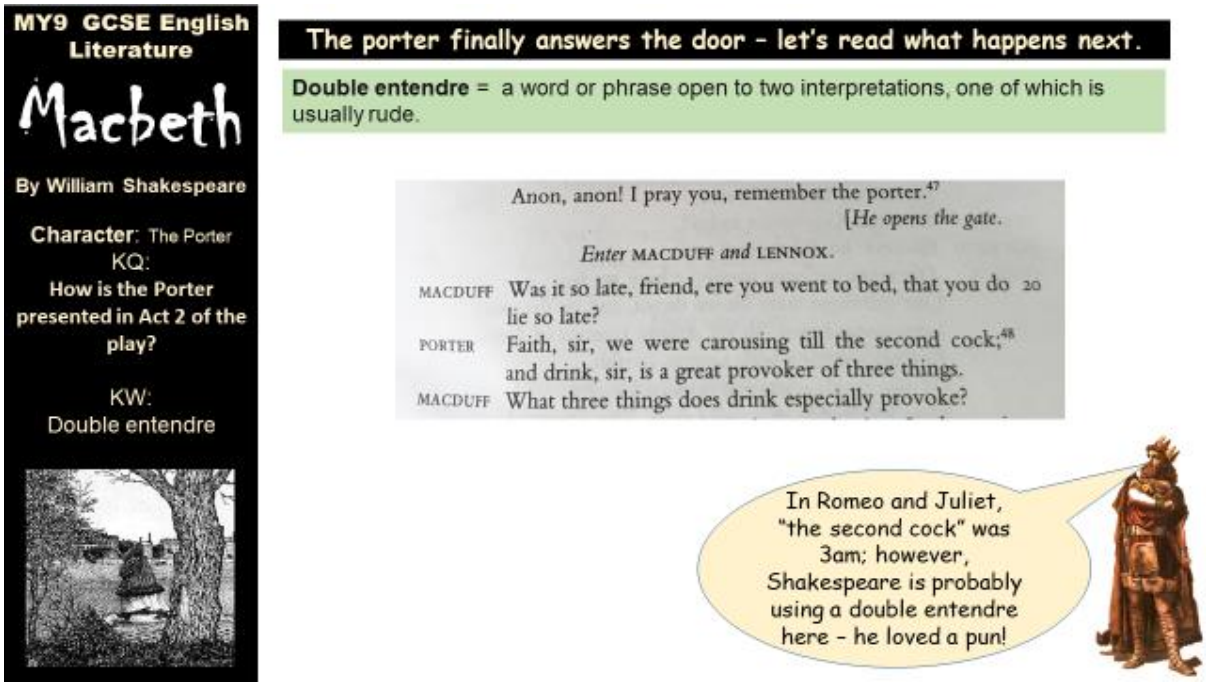
Figure 4.19 *Lesson slide with no information included in the table for the combined approach*



4.4.6 Discrete knowledge-only based lessons: all participants

In addition to the lessons on the witches, Macbeth, and Lady Macbeth, both cases and controls undertook a series of lessons based on learning about the plot of the play and some of the minor characters. This was because changes to the school structure and timetabling (to necessitate the need for social distancing between year groups during the pandemic) meant that the newly recruited cohort were generally taught by one English teacher for three lessons a week and a different teacher for the other lesson. While this in itself would have not compromised the intervention, some of the teachers delivering the single lessons taught in both sides of the year group, increasing the possibility of contamination between experimental and control groups had they taught the main intervention lessons (see the process evaluation in Figure 4.33 for further details). To help mitigate this, an additional 10-lesson knowledge-based scheme of learning was written and developed for the intervention, by the researcher, for teachers taking students for a single lesson during the week to deliver (as shown in Figure 4.1). This meant that no teacher delivering knowledge-only based lessons to the control group delivered any of the metacognitive interventions to the experimental group, or had access to any of the resources for it. Content for this series of lessons began with lessons designed to develop students' understanding of the play's plot, and included watching the Royal Shakespeare Company's 2018 stage-based version of the play (Lough, 2018). The lessons then focused on scenes involving some of the minor characters, such as the porter, King Duncan and Hecate, which were not included in the main intervention. Furthermore, the domain knowledge learned in these lessons was not required to complete any of the assessments used as measures in Study 1. An example of a slide from one of the discrete knowledge-only based lessons taught to all participants can be seen in Figure 4.20.

Figure 4.20 *Lesson slide from the additional subject knowledge-based series of lessons*

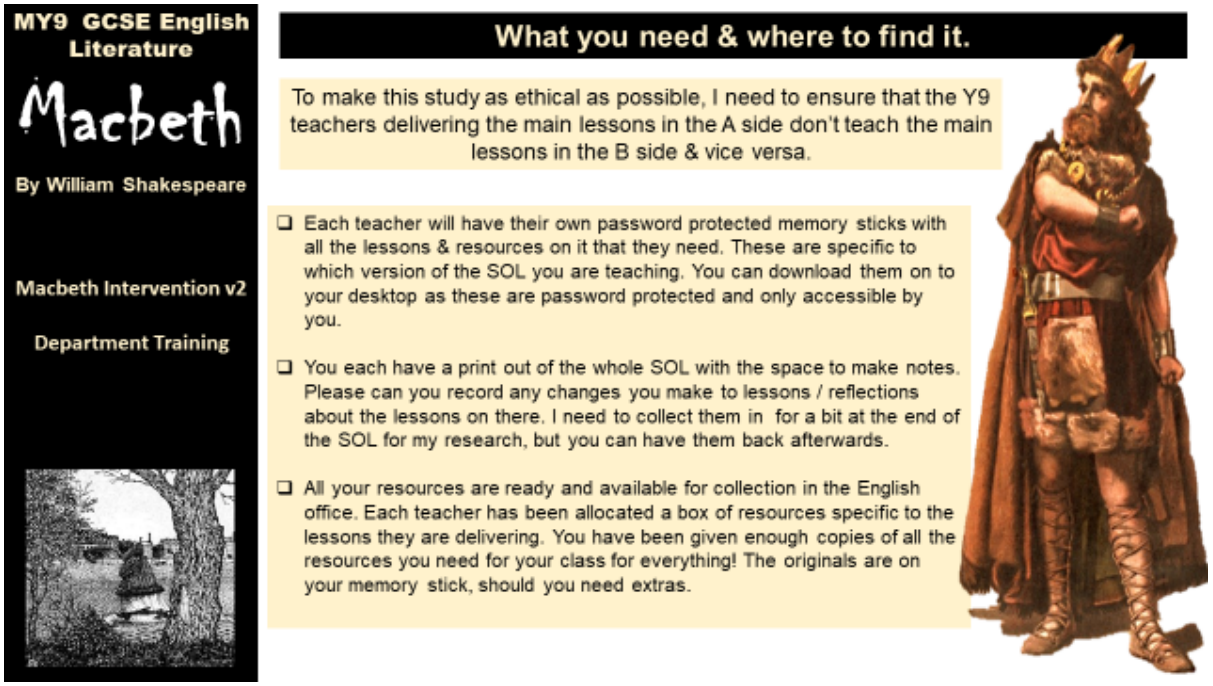


In addition to analysing and annotating extracts from the text, tasks from this series of lessons also included a plot sorting activity; summarising the plot of the play in exactly 100 words, and designing a set and costumes for the witches, which showed Hecate's authority in relation to the other witches. No written assessments were included in these lessons to avoid overloading participants with too many assessments and to reduce opportunities of cross-contamination between control and experimental groups.

4.4.7.Teacher Training and Resources

All English teachers delivering intervention lessons received a two-hour training session and a copy of all resources one month before the start of the intervention. An example of an information slide from the teacher training session is shown in Figure 4.21.

Figure 4.21 *Lesson slide from the subject knowledge-only teacher training session*



This session was designed to give an overview of the knowledge-only based lessons, before teachers worked through and delivered the baseline lessons. The other purpose of the training was to explain how to deliver the subject content of the baseline lessons (so that they understood how to use the glossaries and text boxes on lesson slides). All lesson resources were created and provided by the researcher, such as worksheets, sorting activities, film clips of key scenes, character profile sheets and detailed intervention PowerPoint slides. In addition to supporting the teachers delivering the intervention, the development of intervention materials, such as detailed lesson slides and resources, were designed to support this experimental approach being theoretically used by other schools, without the need for extensive staff training. Participating teachers were also given information about how to administer all assessments (see Section 4.5 for details) and an overview of the aims of the study, which explained the importance of following the lessons faithfully to maintain the integrity of the intervention aims. Teachers were also offered face-to-face and email support by the researcher to support any questions they may have about the intervention and how to deliver it. During

the length of the study, although teachers used this as an opportunity to check that they were conducting assessments in the right conditions and to keep the researcher up to date with their progress through the scheme, no additional support was requested.

Following the completion of the baseline assessment, teachers delivering the intervention to the treatment group were a given a further two-hour training session and additional resources to show them how to use a metacognitive approach when teaching *Macbeth*. This included an explanation of the metacognitive process and the theories used in the combined approach, such as dual-coding and spaced learning. The researcher also demonstrated how to deliver the 3-minute recall and presented the videos created to explain how to use explicit modelling and create dual coded revision cards. Teachers delivering lessons to the control group were given no further training. As previously stated, due to the creation of the discrete knowledge-only based lessons, no teachers delivering lessons to the control group also delivered lessons to students in the experimental group.

4.5 Measures

4.5.1. Academic Attainment

Scores from participants' extract-based essay examination responses (to tasks such as: "What impression does Shakespeare create of the witches in the extract below?") were used to measure academic attainment. This was to test the hypothesis that students exposed to a combined knowledge-based and metacognitive approach to studying *Macbeth* would show higher levels of academic attainment that those exposed to a knowledge-based approach. Students were awarded a score of 0-15 using Eduqas' Generic Assessment Objectives mark scheme for the extract-based section of the Shakespeare component of their GCSE English Literature examination (see Appendix B1). Eduqas is the awarding body used by the participating English department for their GCSE Literature examinations and, consequently,

this mark scheme adheres to the same criteria used by the department to score similar extract-based essay responses, which participating students will also be assessed with as part of their terminal GCSE English literature examinations in 2023. Use of the awarding body's success criteria throughout the intervention, also increased the potential for it to be rolled out and utilised by other schools using the same examination board, alternatively it could be adapted to meet the assessment criteria of other examination boards.

Students were scored with a specific mark, rather than placing them within one of the subject criteria's five bands, so that data could be analysed with more accuracy. For example, if a student scored 4 marks in their baseline assessment, 5 marks in their mid-intervention assessment and 6 marks in their post-intervention assessment, then this system allowed for a more nuanced analysis. However, had banding been applied as the measure for student assessment, rather than a specific mark, then the student would have scored in Band 2 throughout the study and ostensibly not made measurable academic progress.

4.5.2 Memory for Quotations

Participants' accuracy in memorising quotations was measured using their scores from a homework task, which asked them to learn 15 quotations from the play by heart pre-, mid- and post-intervention (as shown in Figure 4.22). Each test was based on a different character from the play that related to the character(s) they were studying in lessons (the witches, Macbeth and Lady Macbeth). Students were scored out of 30, using a two-mark per quotation marking system. If the quotation was transcribed completely accurately, with no errors, students were awarded two points, a transcribed quotation with up to three errors, or missing words, was allocated one mark. If an assigned quotation had not been included, or contained four or more errors, or was not from the allocated quotations given out as homework, it was given zero marks. Spelling inaccuracies were counted as errors, but punctuation inaccuracies were not.

Figure 4.22 *Macbeth quotation list*

Macbeth quotations
“brave Macbeth – well he deserves that name-“
“Macbeth! That shalt be king hereafter”
“The Thane of Cawdor lives; why do you dress me in borrowed robes”
“If chance will have me King, why, chance may crown me.”
“Stars hide your fires! Let not light see my black and deep desires.”
“If it were done when ‘tis done, then ‘twere well it were done quickly.”
“We will proceed no further in this business. He hath honoured me of late”
“I dare do all that may become a man; Who dares do more is none.”
“False fate must hide what false heart doth know.”
“Thou hast it now King, Cawdor, Glamis, all … I fear thou play’dst most foully for’t.”
“To be thus is nothing. But to be safely thus”
“Upon my head they placed a fruitless crown”
“O full of scorpions is my mind”
“By the pricking in my thumbs, Something wicked this way comes.”
“none of woman born Shall harm Macbeth.

4.5.3 Psychometric measures

Participants were asked to complete self-report measures of their metacognition, self-efficacy and academic anxiety using scales taken from Pintrich’s (1991) Motivated Strategies for Learning Questionnaire (MSLQ) . The complete MSLQ consists of 81 items, divided into six motivational and nine learning subscales. Motivational scales include: Intrinsic Goal Orientation, Task Value, Control Beliefs, Self-Efficacy for Learning and Performance, and Test Anxiety. The Learning subscales consist of: Rehearsal, Elaboration, Organisation, Critical Thinking, Metacognitive Self-Regulation, Time and Study Environment, Effort Regulation, Peer Learning, and Help Seeking. Scoring is determined by calculating the mean of all items within the scale, and each scale can be used independently (Pintrich et al., 1993). See Appendix

B2 for Pintrich's table of descriptive statistics and internal reliability for the MSLQ. For the purposes of the study, only three sections from the MSLQ were used: Metacognitive Self-Regulation, Self-Efficacy for Learning and Performance, and Test Anxiety. All items were included from each scale, to maintain the integrity of the MSLQ. These traits were selected as they related directly to the Metacognitive Task Completion Process model, which was created and presented as part of this thesis, as presented in Figure 2.1.

The term "English" was added in brackets to some items to help participants focus on the curriculum subject, rather than study in general. For example, the item, "I ask myself questions to make sure I understand the material I have been studying in class." was adjusted to, "I ask myself questions to make sure I understand the material I have been studying in class (in English)". Students self-rated their responses using a seven-point Likert scale, which ranged from one representing," not true at all of me", to seven, representing "very true of me". See Appendix B3 for participant psychometric measures questionnaire.

Student Metacognition

Participants' control and regulation of metacognition was measured using self-rated responses to all 12 items from the Metacognitive Self-Regulation scale of the MSLQ (items 14-25 on the student questionnaire shown in Appendix B3). This was used to test the hypothesis that students exposed to a combined knowledge-based and metacognitive approach to studying *Macbeth* will show higher levels of self-reported use of metacognition in their academic learning that those exposed to a knowledge-only based approach in the control group. The scale was designed to measure learners' use of the metacognitive process (planning, monitoring and regulating) when studying. Two items in the scale were negatively worded (items 14 and 21 from the questionnaire administered to students, as shown in Appendix B3) and thus reverse coded

before the mean of the scale items was calculated for each participant's pre and post-intervention scores.

Student self-efficacy

The eight-item Self-Efficacy for Learning and Performance scale from the MSLQ was used pre- and post-intervention to measure participating students' expectancies of success in completing and performing a task (items 1-8 on the student questionnaire, shown in Appendix B3). This was included to test the hypothesis that students exposed to a combined knowledge-based and metacognitive approach to studying *Macbeth* will show higher levels of self-efficacy in their academic learning that those exposed to a knowledge-based only approach.

Student academic anxiety

Participants' academic anxiety was measured using their mean score on the five-item scale for Test Anxiety in the MSLQ (items 9-14 on the student questionnaire, shown in Appendix B3). Items in the scale measured both the adverse thoughts that can upset academic performance such as, "When I take a test I think about the items on the other parts of the test I can't answer." and the physical responses such as, "I feel my heart beating fast when I take an exam." This measure was used to test the hypothesis that students exposed to a combined knowledge-based and metacognitive approach to studying *Macbeth* will show lower levels of academic anxiety that those exposed to a knowledge-only based only approach.

4.6 Procedure

4.6.1 Academic Attainment

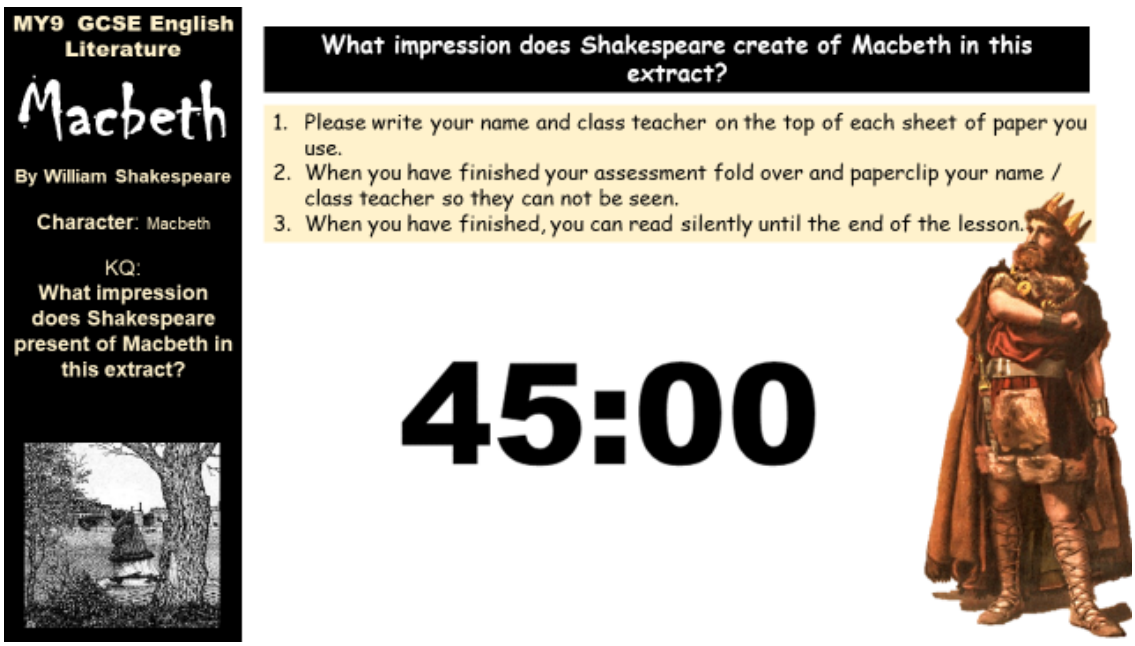
All participants completed the extract-based examination tasks pre-, mid- and post-intervention, following the series of lessons designed to teach them the subject-knowledge

required to undertake the assessments. To check for any variation between groups, all students sat the same pre-intervention baseline assessment based on extracts they had studied in the first six lesson of the intervention ("What impression does Shakespeare create of the witches in this extract?" – taken from Act 1, Scene 3 of the play). Until the completion of this assessment, all learners were taught the same knowledge-based approach to ensure the baseline assessment was an accurate and fair. Participants then followed either the treatment or business-as-usual lessons and completed two further GCSE-style assessments, both based on the character Macbeth. The original extract-based assessment designed to be sat by students at the end of the study, in their end of year mock examination was changed during the study. This was because none of classes had completed all nine Lady Macbeth lesson and so would not have studied the text used in the original assessment extract ("What impression does Shakespeare create of Lady Macbeth's state of mind is this extract?" - taken from Act 5, Scene 1 of the play). Instead, in consultation with classroom teachers delivering the lessons, the final assessment was changed to one about Macbeth. Thus, it was changed to "What impression does Shakespeare create of Macbeth in this extract?" – taken from Act 2, Scene 2 of the play. This ensured that all students were exposed to the declarative knowledge required to complete the assessment. Students in both groups studied the same extracts and tackled the same assessment titles. To help maintain the integrity of the study, neither the participants, nor the teachers delivering the intervention knew in advance which extracts would be used in the assessment, with teachers collecting the assessment examination papers from the researcher on the morning of the examination. Students were given 45 minutes to complete each assessment in high-control examination conditions, with no support or assistance from teaching staff, other than the instructions given on the PowerPoint slide with the timer, shown in Figure 4.23. Pre- and mid-term assessments were sat in individual classes, while all participants sat the post-intervention assessment in their

Year 9 English Literature trial examination in the school hall and designated examination rooms, as part of the participating school's trial examination week for Year 9 students.

To assist with consistency in marking, all assessments were blind marked by the researcher. Furthermore, the researcher had received detailed training in how to apply the success criteria; attended examination board moderation sessions, and marked GCSE English literature scripts, including *Macbeth* extract responses, through their role as a GCSE English literature examiner for Eduqas. Completion of this training helped add to the robustness and accuracy of participants' assessment script scoring. In line with departmental feedback policy, a random sample of six scripts from each teaching group were also moderated and recorded by the head of department before marks were given back to the rest of the department and students. This was typical practice, designed to maintain high levels of standardisation and consistency across the department. Every script moderated by the head of the department aligned with scripts marked by the researcher and no adjustments were made to any student scores.

Figure 4.23 *Lesson slide used to explain to participants how to complete the academic assessment*



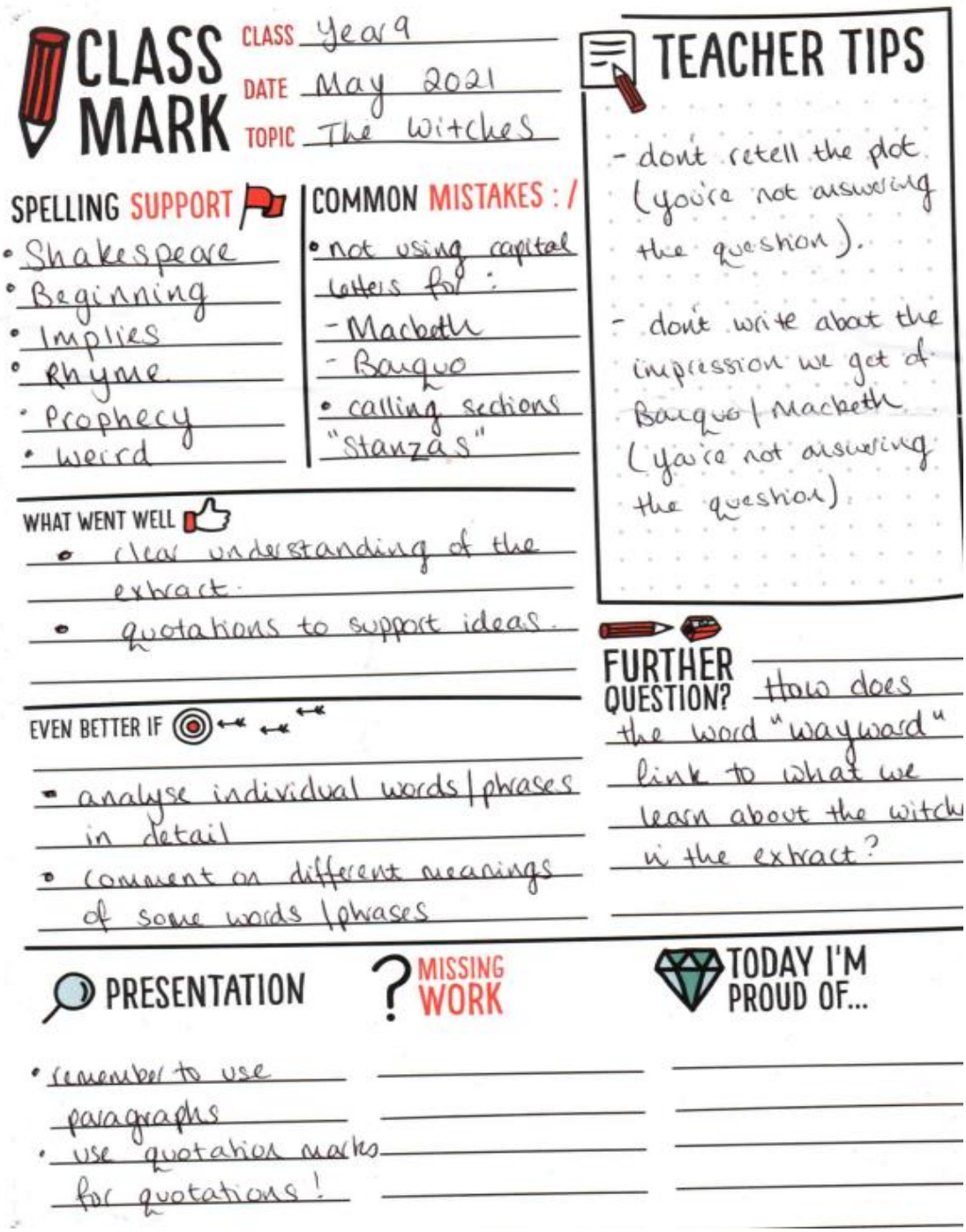
4.6.2 Assessment feedback

Giving students timely and apt feedback on their work is a valuable means of providing students with the information required to improve their learning (Colin & Quigley, 2021; Newman et al., 2021) and develop specific targets for how to progress in similar tasks. Providing students with feedback is not only standard pedagogical practice, teachers are also required to, "give pupils regular feedback, both orally and through accurate marking, and encourage pupils to respond to the feedback" (DfE, 2011, p. 12) in the latest iteration of the Teachers' Standards, laid down by the Department of Education. In order to provide standardised feedback to all participants, who had completed the assessment, the researcher created additional feedback lessons in direct response to participants' performance in the assessment. Feedback lessons were designed to take one lesson to deliver and consisted of class feedback sheets; coded marking; examples of common misconceptions and errors in students' work; a reminder of the Top Tips for writing. and exemplar paragraphs for students to assess. As this lesson was directly responding to how students had performed in the assessment and to ensure they were as accurate as possible, it was not possible to create these lessons before students began the intervention. However, they were a planned part of the intervention and participating teachers knew and were expecting to give students feedback as soon as scripts had been assessed. Although research suggests feedback plays a significant role in students' learning, it was not a measure for this study and consequently students in both the control and experimental group were given identical slides and resources to ensure they were given equal and fair access to assessment feedback.

Class Feedback Sheet

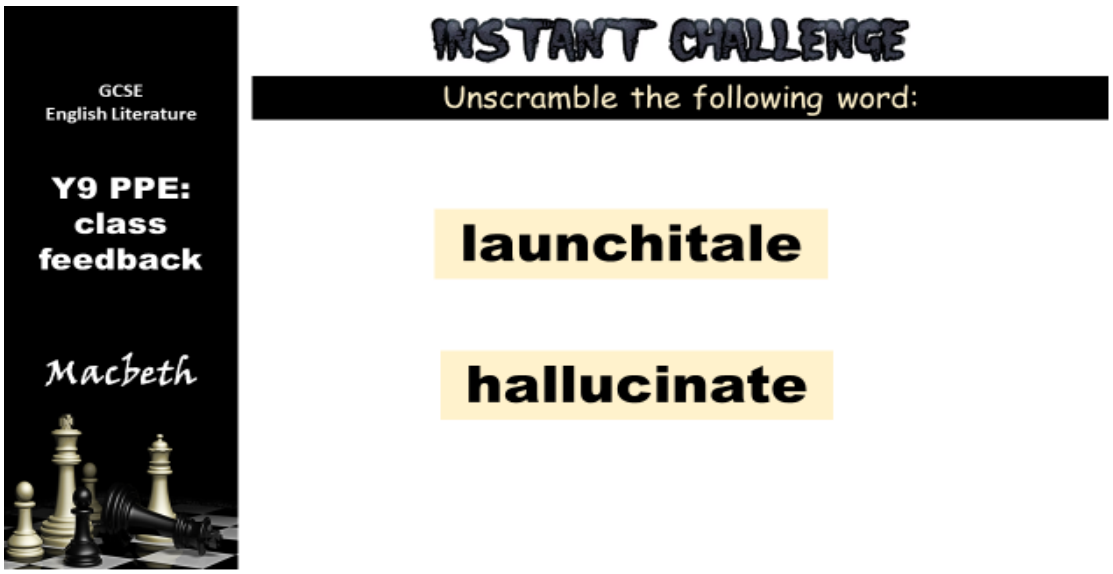
The researcher provided a one-sided feedback sheet using the whole class feedback template utilised by the participating department as both teachers and students were familiar with this format and were confident in being able to use it effectively, as shown in Figure 4.24.

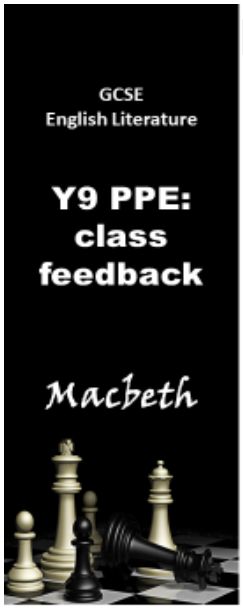
Figure 4.24 *Whole-class feedback sheet given to students following the Witches assessment*



Photocopies of the sheet were provided for each student to stick into their book and refer back to. In the example shown in Figure 4.24, taken from class feedback sheets given to students after they had completed the baseline assessment on the Witches, feedback included the identification and correct spelling of common spelling errors (the name, Shakespeare, was incorrectly spelt in nine different ways by students across the year group) and grammatical and terminology mistakes. For example, the sheet reminded students to use capital letters for proper nouns (such as Banquo); to structure their ideas through the use of paragraphs, and not to refer to sections of the play as stanzas. The sheet also cited what students had generally done well, such as using quotations to support ideas, and what they could do to further improve, such as analysing Shakespeare's use of language in more depth. Errors referenced in the whole class feedback sheets were also included in the assessment feedback slides to give students additional opportunities to reflect on and learn how to address grammatical mistakes. For example, Figure 4.25 shows the feedback slide presented to students following the completion of their final assessment in the post-intervention, academic attainment assessment (as shown in the timeline in Figure 4.1).

Figure 4.25 *Slides highlighting student spelling errors in the post-intervention assessment responses*



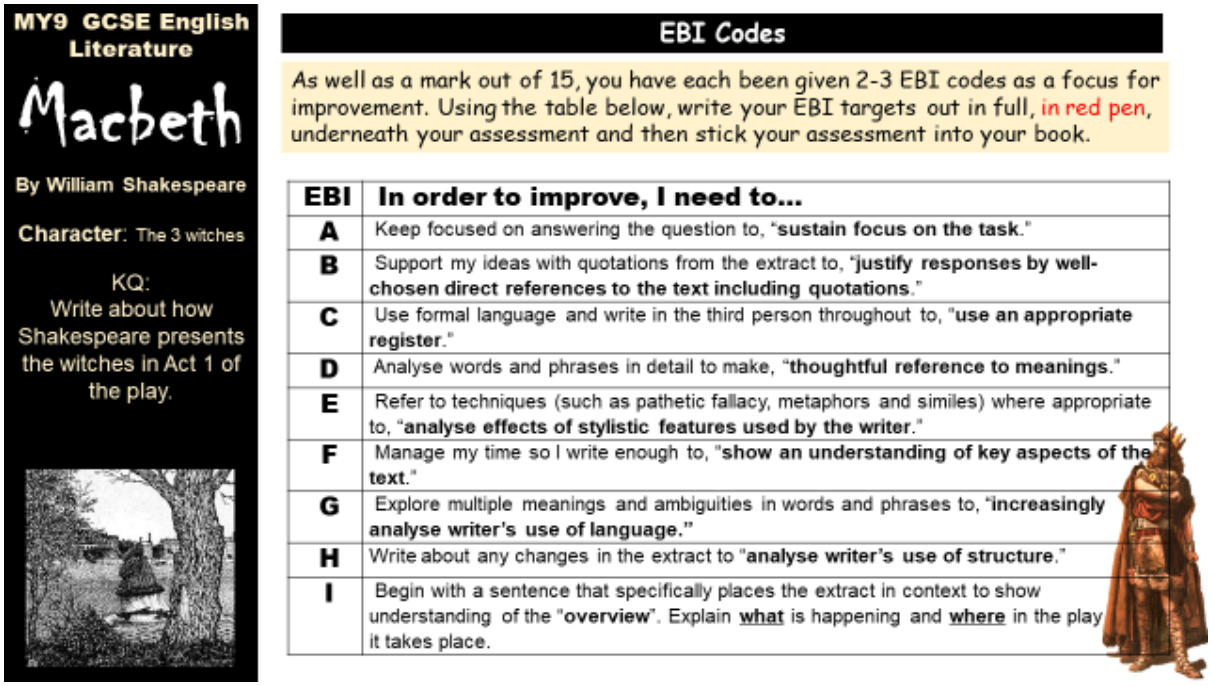


Both of these slides were animated, so that students did not see the answers until they had tried to answer the question on the first of the two slides. Each teacher could adapt how students responded to the question, such as asking them to work in pairs; use cold call questioning, or write their answers on mini-whiteboards and hold them up so teachers could assess their answers.

Coded marking

In addition to the class feedback sheets, each student was also given two to three personal targets for each of their three written assessments. These were recorded at the end of the assessment along with their final mark. This was included so that they (and their classroom teacher) had individual feedback on what they needed to do to progress in their next assessment. Targets were explicitly linked to the success criteria to the task and feedback was delivered through the use of coded marking and a PowerPoint slide was provided for teachers to show targets in class, as shown in Figure 4.26.

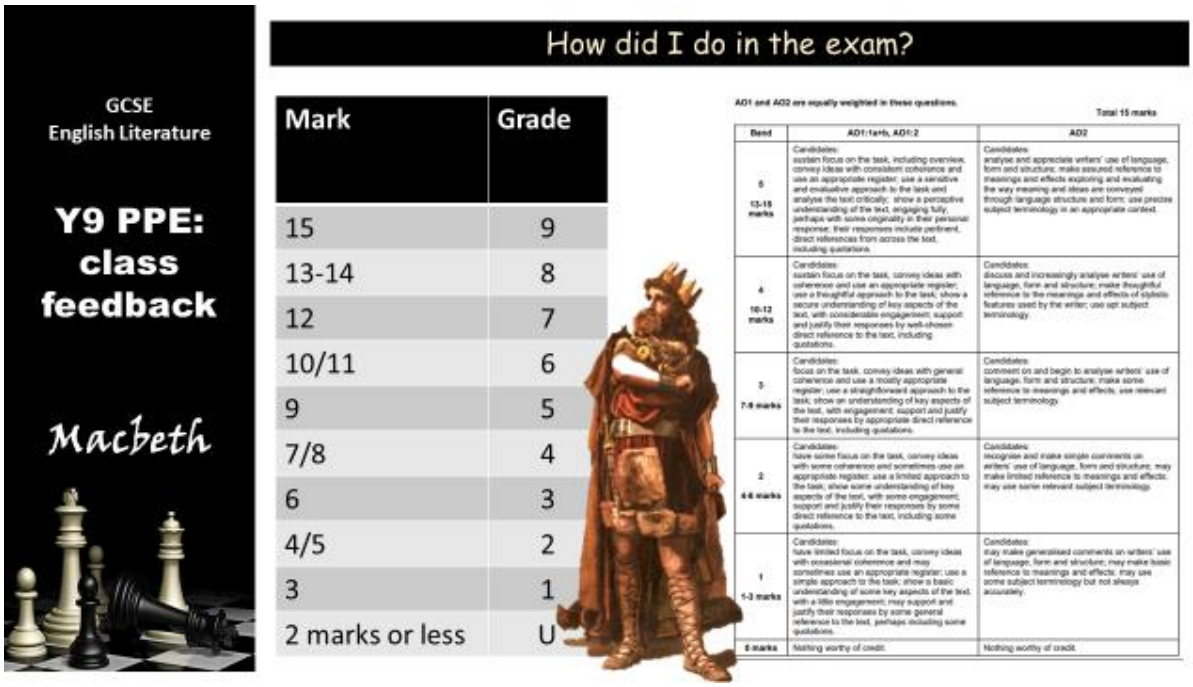
Figure 4.26 *Examples of coded marking targets for students*



Both participating students and teachers were familiar with the coded marking system as it was a system used frequently within the participating school's English department. Coded marking is a strategy suggested in the EEF guidance report on providing effect feedback as a part of its advice to carefully consider how to use purposeful, effective and time-efficient written feedback (Colin & Quigley, 2021). Instructions were also briefly given at the top of the slide to prompt students into writing out their targets in full. This was partially to ensure that students knew what their individual targets were and partially to improve consistency across groups. It also meant that the researcher could save time and turn the scripts around and return them to classes in less than a week, rather than hand writing each comment on the individual scripts of the 156 students participating in the study and their own class (who still followed the lesson, although they were not included in the study). Providing timely and focussed feedback was another of the second of six recommendations provided by the EEF in their guidance report on providing effective feedback (2021). Students were also presented with a slide, as shown in Figure 4.27, that showed them how their mark equated to the current grade GCSE boundaries,

as set by the participating school's Head of English (with the caveat that exam boundaries change from year to year depending on how the national cohort perform, so a mark that may achieve a Grade 5 in one year, could only achieve a Grade 4 the year after). Providing students with GCSE grades for their trial examination assessments was also a reporting requirement of the participating school.

Figure 4.27 *A slide converting exam marks into GCSE grades*



Reflecting on the assessment extract

Feedback lessons also provided students with the opportunity to reflect on the extract included in the assessment and consider, under the guidance of their classroom teacher, their understanding of the extract and what they learnt about the character in the assessment extract. All students were shown a clip showing a performance of the extract and then asked to list as many things as they could recall about it, as shown in Figure 4.28.

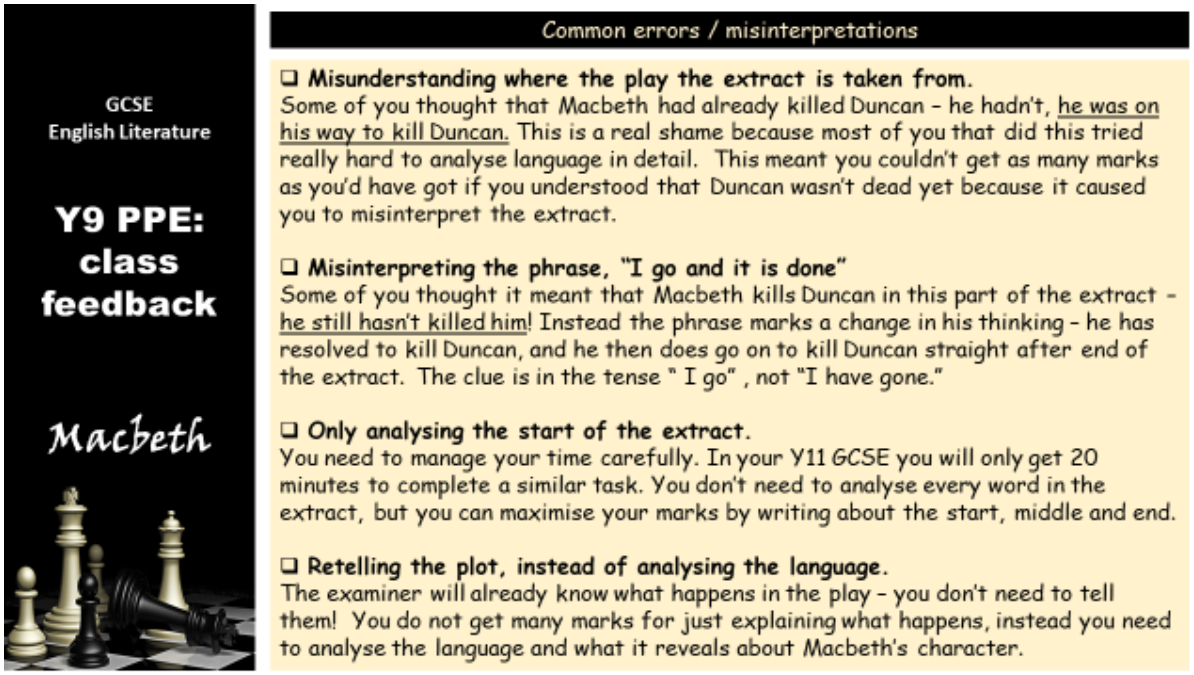
Figure 4.28 *A lesson slide asking students to reflect on their knowledge of the assessment extract*

A slide containing the assessment extract was also included in the presentation so that teachers could work through it with students, if desired.

Addressing misconceptions and procedural errors

The four main misconceptions and errors were also identified and included on the slide, as shown in Figure 4.29.

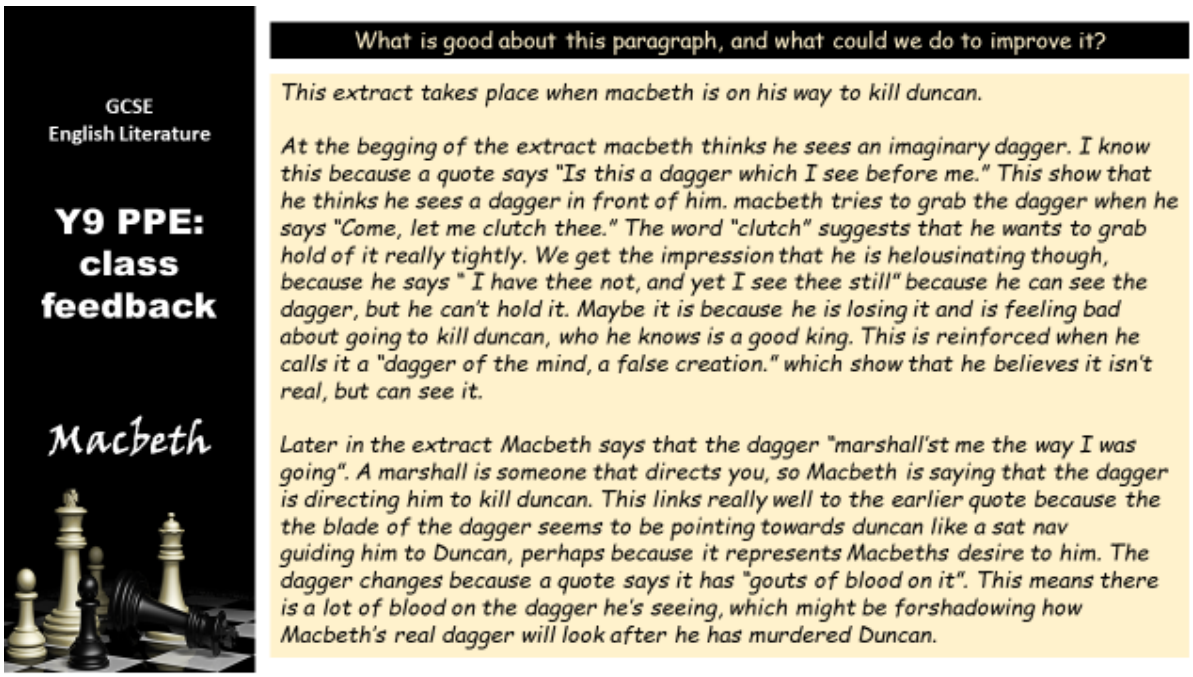
Figure 4.**29** *A feedback slide asking students to reflect on their knowledge of the assessment extract*



To manage cognitive load and give more detailed exemplifications, each error was animated so that the class could work through them one at a time and review if this was a mistake they had made in their own work. To help maintain consistency and support students in understanding why the mistakes were significant, a more detailed explanation of each error was also included on the slide. In some instances, such as in the first misconception listed in the bullet points on the slide shown in Figure 4.29, an explanation was included about how this had impacted on their mark. These explanations also gave tips to students about how they could improve their approach to gain higher marks in a similar task, such as writing about the start middle and end of an extract, as shown in the third bullet point. Copies of this slide were also available for students to stick into their books to refer to later on. This information was then followed by a slide reminding students of the seven Top Tips (Figure 4.3) they could use in assessments to help keep them on track.

Finally, students were given an extract written by the researcher which exemplified the common spelling, grammatical and analytical errors made by students, as shown in Figure 4.30

Figure 4.30 *A feedback slide asking students to reflect on their knowledge of the assessment extract*



Students were directed to assess the assessment response and give feedback on its strengths and areas for development. Although teachers were not permitted to explicitly model how to write the paragraph, as this metacognitive strategy was only being used being used in the experimental group, they were able to adapt how they used this resource to meet the needs of their class. For example, students could highlight and annotate strengths and weaknesses independently on the extract before teachers instigated a classroom discussion on this. Students requiring more support could work in pairs and / or parts of the response before feeding back their ideas to the rest of the class under a visualiser.

4.7 Memory for Quotations

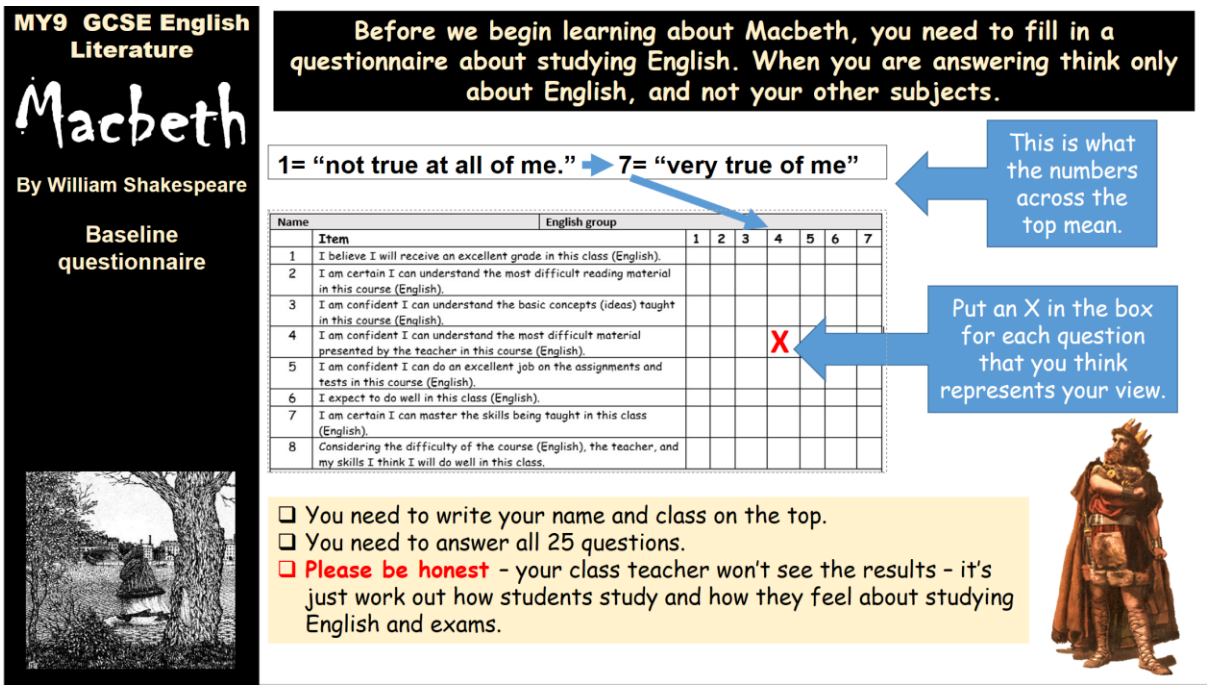
Participants were each given a list of 15 quotations to learn off by heart to test their ability to memorise specific quotations accurately. Pre-intervention, each student was given one week to memorise the first list of quotations with no support or guidance from the classroom teacher. During the assessment, they were given 10 minutes to transcribe the quotations in controlled examination conditions. Figure 4.31 shows the instruction slide (with countdown timer) shown to students during the assessments. Following, the pre-intervention baseline test, students were given two more lists of quotations to learn by heart (mid- and post-intervention). Although students in both groups were given identical quotations to learn, students participating in the experimental group were shown explicit guidance in how to use dual coding and spaced learning to help learn them, as described in Section 4.3.4. All memory for quotation assessments were blind-marked by the researcher using the scoring system described in the measures section.

Figure 4.31 *Slide used to explain to participants how to complete the memory for quotations assessment*

4.8 Psychometric Scoring

Participants completed relevant scales from the MSLQ (as shown in Appendix B3) independently in their timetabled English lessons, both pre- and post-intervention, in controlled examination conditions. Although teachers were permitted to read the questions and scales aloud to the class (to assist students with disabilities, special educational needs, or low chronological reading ages) they were not permitted to comment on the content of the questionnaire, or coach students on their responses. To help explain the process to students, provide a prompt for teachers, and maintain consistancy, a PowerPoint slide was provided (Figure 4.32), which teachers read aloud before students began completing the questionnaire. It was kept on display until all participants had completed the questionnaire, so they could refer back to it during the competion of the questionnaire, if required.

Figure 4.32 *Slide used to explain to participants how to complete the pre-intervention questionnaire*



4.9 Analysis

The study was pre-registered on the Open Science Framework (OSF) to aide with transparency, clarity and future replication (Dowey & Asbury, 2021). Pre-registration with the OSF allowed for the study design, research aims, hypotheses, data collection procedures and analytical plan to be documented before the intervention began and thus reduce the potential for creating confirmation bias when developing hypotheses https://doi.org/10.17605/OSF.IO/RGHJC .

Do Year 9 GCSE English literature students exposed to a combined metacognitive and knowledge-based approach to teaching *Macbeth* show higher levels of academic attainment, accuracy for memorising quotations, metacognition and self-efficacy than students exposed to a knowledge-only based approach?

A series of independent t-tests were conducted to evaluate any differences in mean baseline scores (Time 1) between control and experimental groups in: academic attainment; accuracy for memorising quotations; metacognition, and self-efficacy.

A two-way mixed method ANOVA was used to explore if students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* achieved higher levels of academic attainment than students exposed to the knowledge-only based approach. This compared the academic attainment means of the control and experimental pre-intervention (Time 1), mid-intervention (Time 2) and post-intervention (Time 3).

A pairwise comparison was run to identify the differences in academic attainment in the control and experimental group at between Time 1 and Time 2, and Time 2 and Time 3 to help identify where any locus in difference occurred.

A two-way mixed method ANOVA was also run to explore if students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* achieved higher levels of memory for quotation scores than students exposed to the knowledge-based only

approach. This compared the memory for quotation means between control and experimental groups pre-intervention (Time 1), mid-intervention (Time 2) and post-intervention (Time 3).

A pairwise comparison was run to identify the differences in memory for quotation scores in the control and experimental group at between Time 1 and Time 2, and, Time 2 and Time 3 to help identify where any locus in difference occurred.

A further two-way mixed ANOVA was used to test the hypothesis that students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* would show higher levels of self-reported metacognition than students exposed to the knowledge-only based approach. This compared the metacognition means of the control and experimental groups pre-intervention (Time 1) and post-intervention (Time 2).

A two-way mixed ANOVA was also used to test the hypothesis that students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* would show higher levels of self-reported self-efficacy than students exposed to the knowledge-only based approach. This compared the self-efficacy means of the control and experimental groups pre-intervention (Time 1) and post-intervention (Time 2).

Do Year 9 GCSE English Literature students exposed to a combined metacognitive and knowledge-based approach to teaching *Macbeth* show lower levels of academic anxiety than students exposed to a knowledge-only based approach?

An independent t-test was conducted to evaluate any differences in mean baseline scores (Time 1) between control and experimental groups in academic anxiety.

A two-way mixed ANOVA was used to test the hypothesis that students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* would report lower levels of academic anxiety than learners exposed to the knowledge-based only approach.

This compared the academic anxiety means between control and experimental groups pre-intervention (Time 1) and post-intervention (Time 2).

4.10 Ethics

Ethical approval for the study was sought and given from the University of York Department of Education's ethics committee. All students invited to take part in the study were given information about the study and its purpose as well as consent forms for parents and carers to sign (as shown in Appendix B4). Parents and carers were informed that students' data would remain anonymous and that in consenting for their child to take part in the study they were agreeing to their data being included in the study. Parents and carers were notified that they were free to withdraw consent at any point during the study and upon doing so their child's data would be removed from the study; however, it would not be possible to withdraw them from the lessons, as these was being delivered as part of their child's normal timetabled English classes. In order to ensure that parents were fully informed, an opt-in consent form was chosen and any unreturned forms were followed up by students' English classroom teachers until all forms were returned. Five of the parents returned the forms and did not consent to their child's data being used and their data was not included in the study.

4.11 Results

Do Year 9 GCSE English literature students exposed to a combined metacognitive and knowledge-based approach to teaching *Macbeth* show higher levels of academic attainment, accuracy for memorising quotations, metacognition and self-efficacy than students exposed to a knowledge-only based approach?

Students each completed an extract-based essay assessment at three different time points, pre-mid- and post-intervention, to measure their academic attainment levels. Marks ranged from 0

as lowest score to 15 as the highest; therefore, the lower the score the lower the level of academic attainment in the assessments. The mean scores demonstrate that academic attainment increased for both groups between Times 1 and 3; however, it appears that this increase was greater for the experimental group (Table 4.2). The mean scores for memory for quotations also increased for both groups between Times 1 and 2, but in contrast, the memory for quotation scores appeared to reduce for the control group between Times 2 and 3.

Table 4.2 *Students' mean academic attainment and memory for quotations*

	Mean Attainment Control (*n*=76)	Mean Attainment Experimental (*n*=77)	Mean Memory Control (*n*=77)	Mean Memory Experimental (*n*=77)
Time 1	5.43	6.36	10.92	14.39
Time 2	5.36	7.64	11.47	21.10
Time 3	6.67	8.29	9.71	21.52

An independent t-test was run to explore any differences in mean baseline scores (Time 1) between control and experimental groups in academic attainment and accuracy for memorising quotations. The difference in baseline assessment scores for the experimental group at Time 1 for academic attainment (M =6.36, SD =2.47) compared to the control group (M =5.43, SD = 1.95) was statistically significant, t(15) = -2.59, p = 0.11. There was also statistically significant difference in accuracy for memorising quotations baseline assessment scores for the experimental group at Time 1 (M = 14.32, SD = 5.94) compared to the control group (M = 10.92, SD = 5.92), t (152) = -3.42, p = <0.001. These results were expected due to the highest attaining group in the A side (Set 1) being removed from the study, as they were taught by the researcher, meaning that the control group had no students form the highest attaining set contained in it.

A two-way mixed methods ANOVA was run to test the hypothesis that participants exposed to the combined approach would achieve higher levels of academic attainment than

participants following the knowledge-only based approach. As predicted, there was a statistically significant difference in academic attainment scores between groups between Times 1 and 3 ($F(1,151) = 24.52$, $p = <0.01$, $\eta_p^2 = 0.14$). Effect sizes for the partial eta-squared are categorised as small (0.01), medium (0.06) and large (0.14) (Cohen, 1992, 2013). A pairwise comparison was run to identify the differences in academic attainment in the control and experimental group at between Time 1 and Time 2, and Time 2 and Time 3 to help identify where any locus in difference occurred. This showed that for the control group academic attainment levels were not statistically different between baseline testing (Time 1) and the second assessment (Time 2) ($M =0.79$, $SE = 0.14$, $p = 1$); however, academic attainment was statistically significantly increased between Times 2 and 3 ($M = -1.32$, $SE = 0.16$, $p = <0.01$). In comparison, results for the experimental group showed that academic attainment levels were statistically significant both between Time 1 and Time 2 ($M = -1.27$, $SE = 0.15$, $p = <0.01$) and Times 2 and 3 ($M = -0.65$, $SE = 0.12$, $p = <0.01$). The results suggest that the experimental group made more rapid academic progress than the control group, between Time 1 and Time 2, and maintained progress between Time 2 and 3, whereas the control group did not demonstrate any statistically significant academic progress until between Times 2 and 3.

Participants completed a quotation assessment at three different time points, pre-mid- and post-intervention, to measure their accuracy in memorising quotations. Marks ranged from 0 as lowest score to 30 as the highest; the lower the score the lower the number of accurately transcribed quotations in the assessments. A two-way mixed ANOVA was run to test the hypothesis that participants exposed to the combined approach would score higher levels of accuracy than participants following the knowledge-based only approach. As hypothesised, there was a statistically significant difference in accuracy for memorising quotation scores between groups ($F (1,152) = 75.00$ $p = <0.01$, $\eta_p^2 = 0.33$) between Times 1 and 3, which demonstrated a large effect size. A pairwise comparison was run to identify the differences in

memory for quotation scores in the control and experimental group at between Time 1 and Time 2, and Time 2 and Time 3 to help identify where differences occurred. The results demonstrated that for the control group academic memory scores did not show a statistically different increase between baseline testing (Time 1) and the second assessment (Time 2) (M = -0.55, SE = 0.60, p = 1); however, they did show a statistically significant decrease in scores between Times 2 and 3 (M = -1.75, SE = 0.69, p = 0.04). In comparison, results for the experimental group showed that memory scores showed a statistically significant increase between Time 1 and Time 2 (M = -6.71, SE = 0.64, p = <0.01), but not between Times 2 and 3 (M = -0.42, SE = 0.48, p = 1). The results suggest that the experimental group made rapid progress in memory scores, between Time 1 and Time 2, which plateaued between Times 2 and 3, whereas the control group did not demonstrate any statistically significant increase in memory scores between either time points and showed a decrease in scores between Times 2 and 3.

Do Y9 GCSE English Literature students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* report higher levels metacognition and self-efficacy than students exposed to the knowledge-only based approach?

Both metacognition and self-efficacy mean scores appear to increase between Times 1 and 2 for the experimental group in comparison to the control group. A t-test was conducted to explore differences in baseline assessment scores in metacognition for the experimental group at Time 1 (M = 3.72, SD = 0.93) compared to the control group (M = 3.74, SD = 0.92); however, the difference between the two groups was not statistically significant, t (130) = 0.14, p = 0.89. There was also no statistically significant difference between scores for the experimental group (M = 4.49, SD = 0.89) and the control group (M = 4.27, SD = 1.23) in baseline scores for self-efficacy; t (131) = -1.2, p = 0.23. These results suggest that there were no significant

differences between the control group and the experimental group in metacognition or self-efficacy scores at Time 1.

Table 4.3 *Students' mean psychometric scores*

	Metacognition Control (*n*=62)	Metacognition Exp. (*n*=70)	Self-efficacy Control (*n*=62)	Self-efficacy Exp. (*n*=70)	Anxiety Control (*n*=62)	Anxiety Exp. (*n*=70)
Time 1	3.74	3.72	4.27	4.16	4.03	3.80
Time 2	3.61	4.06	4.16	4.78	3.85	3.67

A two-way mixed ANOVA was used to test the hypothesis that students exposed to the metacognitive approach to teaching *Macbeth* self-reported higher levels of metacognition than students taught the knowledge-only based approach. Students self-rated themselves on a 7-point Likert scale from 1 ("not at all true of me") to 7 ("very true of me"). Thus, the higher the score, the higher a student's metacognitive approach to learning. There was a slight increase in the mean score of the experimental group post-intervention compared to a decrease in mean scores in the control group over the same period (see Table 4.3). However, the analysis found that being taught the combined approach did not lead to statistically significant higher levels of metacognition ($F(1,130) = 2.14$, $p = 0.15$, $\eta_p^2 = 0.016$).

A two-way mixed ANOVA was also used to test the theory that students exposed to the metacognitive approach would report higher levels of self-efficacy than students in the control group. Students also self-rated using the same 7-point Likert scale where the higher the score, the higher the student's self-efficacy in learning. As hypothesised, there was a statistically significant difference in self-efficacy between groups ($F(1, 131) = 6.98$, $p = 0.009$ $\eta_p^2 = 0.051$), which also represented a small effect size.

Do Y9 GCSE English Literature students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* report lower levels of academic anxiety than students exposed to the knowledge-only based approach?

Results from the t-test run to explore any differences in baseline assessment scores for the experimental group at Time 1 (M = 3.8, SD = 1.53) compared to the control group in academic anxiety (M = 4.02, SD = 1.53) were not statistically significant, t (131) = 0.81, p = 0.42. A two-way mixed ANOVA was used to test the hypothesis that students exposed to the metacognitive approach would self-report lower levels of academic anxiety than students taught the knowledge-only based approach. Students rated themselves on a 7- point Likert scale from 1 ("not at all true of me") to 7 ("very true of me"). Thus, the lower the score, the lower a student's anxiety. anxiety seems to reduce for both groups between the start and end of the intervention, at Times 1 and 2, as shown in Table 4.3. .However, the analysis found that being taught the combined approach did not appear to lead to statistically significant lower levels of academic anxiety (F (1,130) = 0.71, p = 0.40, η_p^2 = 0.005).

4.11 Process Evaluation

A Template for Intervention Description and Replica (TIDieR) was completed to summarise the study, as shown in Figure 4.33. The TIDieR framework (Hoffmann et al., 2014) was designed as an evaluative tool to both help authors identify the essential ingredients of their research and to assist other researchers in replicating the intervention.

Figure 4.33 *TIDieR evaluation of Study 1*

Item	**Study 1**
Brief name:	A metacognitive approach to teaching *Macbeth*
Who: participants in the intervention	Year 9 students studying English and English Literature
Why: rationale, theory and goal of the intervention	Research indicates that using metacognition and cognitive science in the classroom can have a positive impact on student attainment outcomes. This study was designed to test the impact of teaching using a metacognitive approach on attainment and memory for quotations. It also sought to investigate if this approach increased learners' self-efficacy, metacognition and reduced levels of academic anxiety.
What: materials used in the intervention	All the following intervention and training materials were designed by the researcher: • Face-to-face teacher training on how to deliver the intervention • Additional face-to-face training for teachers delivering the metacognitive strand of the intervention • Teacher packs including: paper copies of training resources and paper copies of all resources used in the intervention. • Lesson materials including: lesson resources student work sheets; assessment materials and lesson PowerPoints for a total of 34 x1-hour lessons. Baseline: 6 lessons Macbeth: 9 lessons Lady Macbeth: 9 lessons Discrete knowledge: 10 lessons • Paper-based MSLQ for students to self-report self-efficacy, metacognition and academic anxiety. • Assessment feedback materials (3 x 1-hour) assessment lessons) including: coded marking grades for each students; whole-class feedback sheets and PowerPoint slides. • Academic and memory assessment materials
What: procedures, activities and process used in the intervention	• 6 x 1-hour baseline lessons and resources (all participants) • 10 x 1-hour discrete knowledge-based one hour lesson and resources (all participants) • 18 x 1hour knowledge-based intervention lessons (control group) • 18 x 1-hour metacognitive approach intervention lessons and resources (experimental group)

	• 3 x 1-hour academic assessment feedback lessons • Teacher training and resources • Face-to-face / email teacher support
Who: providers of the Intervention	The intervention was designed and created by the researcher, a fully-qualified teacher with a curriculum specialism in English and over 16 years of teaching experience. The intervention was delivered by participating students' timetabled classroom teachers to replicate an authentic classroom experience. All teachers delivering the intervention were fully-qualified teachers with curriculum specialisms in English and had been teaching for at least 5 years.
How: modes of delivery	The intervention was delivered face-to face in groups. Groups were based on students' normal timetabled classes and no alterations to groups were made either for or during the intervention.
Where: venue locations	The intervention was delivered in participating students' normal timetabled English lessons in the participating school.
When and how much	The intervention ran from April to June 2021. Students had 4, 1x hour timetabled lessons of English each week and followed the intervention during all 4 lessons. In 3 of the 4 weekly lessons, the baseline / Macbeth / Lady Macbeth lessons were delivered. In the other lesson, the discrete knowledge-only based lesson was delivered to both groups (to mitigate for where cross-contamination could occur between teacher's timetables to teach students for 1x hour per week that taught in both year halves and could potentially contaminate the intervention). In total, students had completed all 6 baseline lessons, all 9 Macbeth lessons and 5 of the 9 Lady Macbeth lessons and 8 discrete knowledge-based lessons.
Tailoring: adaptations to the intervention	The following adaptations were made to the metacognition strand of the intervention following the completion of an acceptability study and the early termination of the original intervention in March 2020 (due to school closures as a result of the Covid-19 pandemic): • 4 short (4 – 8 minute) instructional videos were created by the researcher to model the use of cognitive strategies in the classroom to students. • More opportunities for teacher modelling were created in the metacognitive strand of the intervention • Slides explaining the theoretical knowledge behind use of cognitive strategies were added to the metacognitive strand of the intervention. • Timer added to the 3-minute recall slides

	• Frequency of the 3-minute recall activity increased so it was included in every lesson in the metacognitive strand of the intervention.
Modifications: changes made during the course of the study	• The extract for the final assessment for academic attainment (Time 3) was amended as not all students had completed the full 9 Lady Macbeth lessons designed for the study. • As each class had completed all 9 lessons from the study about the character Macbeth, the extract was changed to, "What impression does Shakespeare create of Macbeth in this extract?" The extract was taken from Act 2, Scene 2 to ensure that all students would have been exposed to the declarative knowledge required to complete the assessment. The original assessment question was about Lady Macbeth's state of mind in Act 5, Scene 1.
How well (planned):	• Training (2 hours) delivered to all teachers teaching the intervention. • Additional and separate training (2 hours) delivered to teachers teaching the metacognitive strand of the intervention • Timetabling and staffing of lessons reviewed to assess the possibility of contamination from teachers delivering the intervention to both control and experimental groups. • Additional 10-lesson knowledge-based sessions of lessons designed and delivered to prevent contamination of teachers timetabled for one hour of lessons in both control and experimental groups • Clear instructions included on lesson slides for students (and teachers) about assessment conditions and protocols • All assessments taken in standardised, high-control, timed conditions with no teacher support given in the duration of assessments. • On-going face-to-face and email support available to staff delivering the intervention if required • All assessments blind marked by the researcher • Clear criteria identified and applied to assessment scoring • Researcher participated in examination board moderation sessions to increase expertise in standardised marking of assessments

How well (actual)	• Although lessons were designed to be delivered in an hour's timetabled lesson, it sometimes took teachers longer to deliver the lessons. This was mainly due to the high volume of content in each lesson, particularly the groups with lower attaining students (Sets 3 and 4). No adjustments were required to lesson materials; however, it took teachers longer to address misconceptions and work through the content than planned. Furthermore, the intervention took place in the summer term, which (due to the timetable roll over of participating school two weeks before the end of the academic year and timetabling of trial exams) meant that there was no flexibility to allow for any overrun of lessons. • Although there was no long-term teacher absence during the study, 4 teachers were absent for a total of 9 lessons, including 1 teacher that was absent for 2 of the experimental lessons. During these absences, cover was set from the discrete knowledge-based only lessons, which were designed so that the knowledge learned did not contribute to any student assessments taken during the study and could be delivered by teachers that did not have a subject specialism in English literature.

4.12 Discussion

Do Year 9 GCSE English literature students exposed to a combined metacognitive and knowledge-based approach to teaching *Macbeth* show higher levels of academic attainment, accuracy for memorising quotations, metacognition and self-efficacy than students exposed to a knowledge-only based approach?

Both the control group and the experimental group demonstrated increased academic attainment scores at the end of the intervention (Time 3), compared to pre-intervention (Time 1), as would be expected over the course of their study. The inclusion of detailed assessment feedback was included as part of the design of the intervention for both groups as it is not only a part of the Teachers' Standards for Education (DfE, 2011) but also a constituent part of effective pedagogical practice. Not providing students equal access to assessment feedback

would not only constitute a breach in adherence to Teacher Standards, it would also add a further strata of difference between the two approaches to teaching. Providing both groups with equal access and time to respond to the assessment feedback material removed another variable that may influence student attainment. Furthermore, it was anticipated that as both groups increased their domain knowledge about the play, success criteria and what they needed to do to progress this would also help participants progress and secure higher assessment scores. Thus, the increase in student attainment scores in the control group was anticipated and planned for as part of the business-as-usual approach.

It is likely that the difference between the assessment scores at baseline was due to the difference in prior academic attainment between the two groups. The control group consisted of Sets, 2, 3 and 4 whereas the experimental group was made up of Sets 1,2, and 3. Classes in the participating school were set by prior attainment, with Set 1 comprised of the highest attaining students. Although Set 1 in the control group was removed from the study to help ensure the fidelity of the trial (the researcher was the class teacher for this class) it did also mean that the control and experimental groups were not balanced in terms of academic attainment and baseline scoring was used to adjust for this difference during data analysis. The removal of Set 1 from the control group was a significant limitation on the study; however, it does reflect the complex and messy reality of conducting experimental research in authentic classroom settings. Despite the increase in mean academic attainment scores in both groups, the experimental group achieved higher assessment scores that the control group from Time 1 to Time 3. Even when moderating for the higher baseline scores of the experimental group (6.36), compared to the control group (5,43), this difference was statistically significant and represented a large effect size of η_p^2 = 0.14.

The largest effect size was found between Times 1 and 2 of the intervention (η_p^2 = 0.233). During this time, the experimental group's mean academic attainment scored jumped

from 6.36 to 7.64 in contrast to the control group in which mean scores decreased very slightly from 5.43 to 5.36. It may be that the experimental group made more progress during this time as this was the period in which they were learning new cognitive and metacognitive strategies to help them manage their learning metacognitively. Participants' feedback and results from the acceptability study suggested that overwhelmingly students found explicit teacher modelling, where teachers' expertise about how to tackle an assessment was shared with the class, as most useful in helping them improve their academic scores and understand for themselves how to tackle the task. Although students in the control group were given examples of what a successful response looks like, and the same materials and Top Tips for success as the experimental group, they were not explicitly shown by the teacher how to construct a successful response and this may have impacted on their progress at a time when they were also processing a lot of new information about the play. Mean score results showed that students in the control group made more progress between Times 2 and 3, increasing from 5.36 to 6.67 respectively. As previously stated, an increase in attainment between both groups was expected, as the curriculum content and feedback delivered to all participants was designed to increase their domain knowledge of the play. However, it appeared to take longer for students in the control group to make progress and overall they did not make as much progress as their peers in the experimental group. Academic attainment mean scores also increased for students in the experimental group between Time 2 and Time 3 (7.64 and 8.29) respectively. Although the increase in mean scores was not as high for students in the experimental group between Times 2 to 3, compared to participants in the control group, this may be because they had already made significantly more progress than the control group between Times 1 and 2. Furthermore, the support that students in the treatment group were given between Times 1 and 2 (such as the explicit teacher modelling of cognitive and metacognitive strategies) was faded out between Times 2 and 3. This was designed to foster a more independent approach where

students were able to complete tasks with less teacher guidance / scaffolding and, in doing so, increase the level of challenge, or "desirable difficulties" (Bjork, 1994), that students were exposed to.

Results also indicate that the metacognitive approach increased students' ability to memorise quotations. As with academic attainment scores, students in the experimental group achieved a higher mean score in the baseline assessment (14.39) out of a potential maximum of 30, compared to the control group (10.92). This might also be due to participants in the experimental group consisting of classes based on higher prior attainment that the control group. Despite this disparity, there was a statistically significant difference between groups of η_p^2 = 0.33 between Times 1 and 3, with the experimental group making significantly more progress over time. This represents a large effect size suggesting that the metacognitive intervention was more effective in helping students memorise quotations than the knowledge-only based approach. The largest increase for the experimental group was between Times 1 and 2 when the mean scores increased from 14.39 to 21.10, in comparison to the control group, which demonstrated a slight increase from a mean score of 10.92 to 11.47. It is probable that the experimental group showed the largest increase during this period as it was the time they were first introduced to and shown how to use cognitive strategies, such as the 3-minute recall, use of dual-coded quotation cards and spaced learning, to help them memorise quotations. Although there was only a slight increase in the mean scores for this group between Times 2 and 3 (21.10 to 21.52 respectively) the scores suggest that these students had consolidated the use of these strategies and continued to use them. Furthermore, between these two time points, participants in the experimental group were instructed to create dual-coded revision cards and utilise spaced learning to help them memorise quotations, but the scaffolding had been removed so that they were given no class time to complete the cards / spaced learning, or additional support in using them. In contrast, the mean memory for quotation scores of students decreased

between Times 2 and 3 (11.47 and 9.71) with the final mean score at Time 3 also being less that for their baseline assessments in Time 1 (10.92). Unlike when students received academic score results, none of the participants were given feedback on how to improve their memory for quotation scores and were only given back their marked list of quotations with a score out of 30

One explanation for the control group's lack of progress in memorising quotations may be because students in this group were not shown or explicitly modelled how to memorise quotations effectively and, therefore, did not understand how to tackle this learning, or were overwhelmed by it. However, it is unlikely that this was the first time that students had been set a memorisation task in school. For example, in the participating school, students in Years 7 and 8 were set fortnightly spelling tests in English lessons where they had to learn up to 20 words and also had to memorise information for end of unit tests in other curriculum areas, such as history and science. Therefore, it may also be that were unable to make further progress without being shown specific cognitive strategies that would help them learn how to memorise quotations. This relates to the experiences related by students in the Ofqual blog (2019b) who were unsure of which strategies to apply or how to revise effectively to memorise information. Furthermore, students' lack of understanding about which cognitive strategies to use makes it much more difficult for them to work their way through the metacognitive process. If they do not have sufficient cognitive strategies to choose from, it makes it harder for them to effectively complete the preparation stage, where they select the strategy that they think will best help them complete the task. Even if they then monitor how well they are doing and realise that the method they are using to help them learn the quotations off by heart is ineffectual they lack the range of strategies to go back and select from to tackle the task using a different method. After the task is complete and they have completed the assessment and evaluated their progress, they may reflect that they need to alter the approach they used, but be unsure about how to do this.

This may result in a reduction in self-efficacy as students do not believe they can tackle the task successfully (Bandura, 1994; Bandura et al., 1999b) and / or impact on their motivation to learn, especially if they are extrinsically motivated with a fixed mindset (Dweck, 2000, 2006; Dweck & Reppucci, 1973). It may be that slight dip in the group mean memorisation scores between Time 1 and 3 could have negatively impacted on students' self-efficacy about how to complete the tasks. This is potentially significant as research suggests that self-efficacy can positively influence academic motivation, persistence and achievement (Fatih & Dandini, 2020; Pajares, 1996; Schunk, 1995).

RQ2 – Do Y9 GCSE English Literature students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* report higher levels metacognition and self-efficacy than students exposed to the knowledge-based approach?

Pre-intervention, both control and experimental groups self-reported similar mean levels of metacognition pre-intervention. Students in the experimental group demonstrated an increase in the self-reported metacognition mean score between pre- and post-intervention (3.72 to 4.06) compared to the control group, but this was not statistically significant. In comparison, the control group mean scores showed a small drop in metacognition from 3.74 to 3.61 over the same time period. This small increase in the control group's metacognitive scores, compared to the drop in control group scores, may suggest that metacognition is a skill that can be developed and enhanced, as advocated by the EEF's guidance report metacognition (2018). One of the main features of the metacognitive approach was the inclusion of explicit teacher modelling of how to tackle assessments and utilise cognitive strategies. Both teacher and instructional video modelling included explanations of how to plan, monitor, evaluate and reflect on learning, thus exemplifying to participants in the experimental group how to apply a metacognitive approach to completing academic tasks. In this context, teachers delivering the intervention could be considered as More Knowledgeable Others, guiding students through

Vygotsky's Zone of Proximal Development to the zone where they were able to learn independently. However, one of the EEF's recommendations was for teachers to develop their own understanding of metacognition and research in this field suggests that teacher understanding of metacognition can have a positive impact on students' metacognitive understanding (Branigan & Donaldson, 2020; Ozturk, 2018; Perry et al., 2018). Therefore, although teachers delivering the lesson to the experimental group were given an additional two-hours of training by the researcher (which included information on the metacognitive process and the theories underpinning the metacognitive and cognitive strategies used in the intervention), it may be that this was not sufficient to increase their depth of understanding about metacognitive theory. See Section 6.1 for a further discussion about the impacts of teacher training on teacher understanding of metacognition.

The control group's pre-intervention mean self-efficacy scores were slightly higher than those of the experimental group, which was unexpected as students in the control group did not contain Set 1 and there is research to suggest that students in lower attaining sets are more likely to perceive themselves as less able to complete a task than students in higher attaining sets (Connolly et al., 2019; Pajares, 1996; Parsons & Hallam, 2014). Despite this difference, the experimental group showed an increase in self-reported mean scores between pre- and post-intervention (4.16 to 4.78) compared to the control group, which once again showed a small drop in scores (from 4.27 to 4.16), representing a small effect size of $\eta_p^2 = 0.051$. This increase in the experimental group appears to support the theory that self-efficacy is likely to be malleable (Bandura, 1977; Bandura & Schunk, 1981; Schunk, 1991) and can be fostered in students. As students in the experimental group also demonstrated increases in both academic attainment and memory for quotations it may be that, as research suggests (Fatih & Dandini, 2020; Schunk, 1995), self-efficacy can positively affect academic achievement. It is possible that as students in the experimental group had been explicitly taught strategies for how

to memorise quotations and tackle academic assessments they felt more confident in their ability to complete the tasks, thus increasing their levels of perceived self-efficacy. Although the control group did show an increase in their academic achievement mean scores, as stated, this was to be expected as they increased their domain knowledge of the text and response to formative feedback. This progress was not as high as that demonstrated in the experimental group, nor was it reflected in their memory for quotations scores, which actually decreased from Times 1 to 3 (following a slight increase at Time 2). During this same time period the control group's mean levels of self-efficacy also decreased, suggesting that that students' lack of academic progress could have negatively impacted their belief about how successful they would be in completing an academic or memorisation task. This may also be because, as results from Honicke and Broadbent's systematic literature review (2016) found, students with lower levels of self-efficacy were less likely to be tenacious, motivated, adaptive or ambitious when completing task than students with higher levels of academic self-efficacy.

It is significant that despite the control group's exposure to the same domain knowledge as the experimental group they did not demonstrate an increase in self-efficacy. It is to be expected that at the start of a new unit of work, where learners are unfamiliar with the course content and domain knowledge, that they experience lower levels of self-efficacy (Galyon et al., 2012; Honicke & Broadbent, 2016). However, for the control group increased understanding about the text and assessment did not lead to increased levels of self-efficiency. This may be because even though they had been taught the subject knowledge they needed to know to be successful, their teachers (as experts) had not modelled how to apply this subject knowledge effectively to complete a task. Where students in the control group were given access to strategies (such as the seven Top Tips for completing an extract-based assessment successfully) and exemplar materials showing successful responses, the writing was not modelled for them. Thus, even when they had materials to help them improve they may not

have had a clear understanding of how to use them, which could have negatively impacted on their belief in their ability to complete the task.

RQ3 – Do Y9 GCSE English Literature students exposed to the combined metacognitive and knowledge-based approach to teaching *Macbeth* report lower levels of academic anxiety than students exposed to the knowledge-only based approach?

Before the start of the intervention, the experimental group demonstrated lower levels of self-reported academic anxiety (3.80) than the control group (4.03) . After the intervention anxiety scores for both groups had decreased with the control group scoring a reduction of 0.18 (post-intervention mean score, 3.85) and the experimental group recording a smaller reduction of 0.13 (post-intervention score 3.67). Thus, there was no statistically significant difference between the two groups in academic anxiety by the end of the intervention, η_p^2 = 0.005. This conflicts with research that suggest that students demonstrating higher levels of self-efficacy also present with lower levels of academic anxiety (Nie et al., 2011).. Although some research has demonstrated promising results in the use of relaxation techniques, cognitive behavioural therapies and holistic interventions in helping to reduce students' academic anxiety (Kumar & Singh, 2017; Reed & Saslow, 1980; Yeo et al., 2016) these approaches were not included in this study as it would have made it difficult to establish if it was impact of such therapies, or the metacognitive intervention that impacted on participants' academic anxiety.

Although all assessments undertaken by participants in the study were taken in high control, standardised conditions they were not high-stakes, terminal examinations, such as GCSEs. The majority of research into academic anxiety seems to centre around high-stakes public examinations (Ergene, 2003; Gregor, 2005; Howard, 2020; Ofqual, 2019a, 2019b) rather than low stakes examination and mock assessments, such as those used in the current study, where it might be expected that students feel greater pressure as their results may well

determine their next academic or career options. Therefore, it could be that students participating in the study were not exposed to the higher levels of pressure potentially experienced by students studying for their GCSE examinations, where they can take as many as 20 different high-stakes assessments within a one-month period. Moreover, the length of the extract-based assessments taken by participants in this study only lasted for 45 minutes. In comparison, students sitting this component as part of their GCSE examination are advised to spend only 20 minutes on this question, placing increased pressure on them. Furthermore, participants in this study completed academic assessments as isolated examinations, rather than as component parts of a more substantial GCSE paper. For example, in their terminal GCSE English literature examinations with the Eduqas examination board students have two hours to complete four different assessment (two based on a Shakespeare text and two based on a poetry anthology). The decision to give participating students 45 minutes to complete the assessments was taken in conjunction with the Head of Department in the participating school to ensure that students could focus on developing their analytical writing skills and familiarising themselves with this style of GCSE question as this was the first time they had been exposed to GCSE-style assessment questions in English literature mock examinations. This was due in part to the loss of face-to-face classroom learning that students had experienced during the school closures as a result of the Covid-19 pandemic. Also, as students were only in Year 9 at the time of the study, it meant that they still had a further two years to hone their time-management skills so that they could complete assessments within the condensed time frame. This may have been why baseline anxiety was not as high in either group as it might have been if they were preparing for a terminal high-stakes examination. Thus, although this decision were made to ensure that students did not feel overwhelmed or over-pressured when undertaking the assessments, it also may have ameliorated the amount of academic anxiety that all participants

experienced during the intervention. Although this discussion is focussed on Study 1, it will be expanded in further detail in the general discussion in Chapter 5.

4.9 Limitations

One limitation of the study was that it was only conducted within one school and with one year group, which meant that the findings were localised to that one school and could not be generalised to different schools and with different GCSE year groups. Moreover, the control and experimental groups were not equally weighted in terms of prior academic attainment as one group (Set 1) had to be removed from the study as they were taught by the researcher and including them would have compromised the fidelity of the trial. However, the removal of this set from the control group was also a significant limitation of this study. Although investigating the impact of the combined metacognitive and knowledge-only approach on different attainment groups was not a measure for this study, it would be an interesting area for further investigation.

Despite the metacognitive approach demonstrating promising results for both academic attainment and memory for quotations, the structure of the lessons as a cohesive unit of learning meant it was not possible to isolate which cognitive and metacognitive strategies had the most impact, or if it was a combination of strategies that yielded an increase in mean scores for both these measures. For example, to help students memorise quotations the experimental group were exposed to the 3-minute recall activity in each of the experimental group's metacognitive approach lessons, as well as being taught how to create dual-coded revision cards and use them with spaced learning. Although participant responses from the acceptability study showed that they found the 3-minute recall to be the most useful teacher-led strategy and making the revision cards as the most useful strategy to use independently, these activities were not isolated in Study 1. Adapting this study to isolate and compare the efficacy of them on students'

outcomes could be beneficial to help work out which had the most impact, or if it a combination of all three strategies that is most effective in helping students to memorise curriculum material accurately.

Time was a further impact on the study, as the change from the original timing of the intervention from the spring to the summer term (due to the closure of schools during the Covid-19 pandemic) and the roll-over of the school timetable in the latter meant that it was not possible for students to complete the full intervention, although all students completed all baseline lessons and 14 of the metacognitive approach, or business-as-usual lessons of and all planned assessments. Furthermore, although the creation of the 10 additional discrete knowledge-based lessons reduced the probability of cross-contamination from teachers teaching both control and experimental groups, completion of the lessons pejoratively impacted on the time required to complete all 18 post-baseline lessons. This also meant that there was no opportunity for students to experience a significant gap between the intervention, as there was in the original design, and a final assessment (Year 9 trial examinations were timetabled for the summer 2 term in the participating school). A more effective method would have been to have students complete a further academic and memory for quotations assessment in the next academic year, which would have made it possible to investigate how much information they had retained and to what extent the effects of the intervention were washed out. Although participating students were due to sit their GCSE literature examination in May 2023 and this includes an extract-based examination question, the scope and length of the study meant that it was not possible to include this data in Study 1. Furthermore, changes in classroom teachers, participation in after school support and in school intervention sessions, as well some participants use of private tutors during the two years between completing the intervention and undertaking GCSE examination would have made it difficult to isolate and measure any additional variables that may impact on student GCSE examination outcomes.

Chapter 5

Study 2: Teacher Understanding of Metacognition

5.1 Context

Research indicates that teacher understanding of metacognition plays a vital role in fostering student understanding of metacognition and use of the metacognitive process within learning (Branigan & Donaldson, 2020; Ozturk, 2018; Perry et al., 2018; Wall & Hall, 2016). The purpose of this study was to investigate teachers' understanding and use of metacognition and explore if it was associated with other factors, such as length of service, and explicit modelling of cognitive and metacognitive strategies in their practice. The research questions for this study were:

How much do teachers understand about metacognition and does this differ on the basis of participation in relevant CPD, teaching experience, subjects taught, Key Stages taught, gender or geographical region of the United Kingdom?

Are higher levels self-reported understanding of metacognition and use of metacognition associated with higher levels of understanding of self-efficacy, and higher levels of use of self-efficacy for teachers when considering their own practice?

Are higher levels of self-reported understanding of metacognition associated with higher levels of use of metacognition for teachers when considering their own practice?

Are higher levels of self-reported understanding of metacognition or use of metacognition when teaching associated with more frequent explicit modelling of metacognitive and cognitive strategies to students in both classroom and online teaching?

Is there a difference in the type, or frequency, of explicit modelling of metacognitive and cognitive strategies between teaching in the classroom and teaching via online platforms?

5.2 Participants

To meet the criteria for the study, participants needed to be qualified teachers who were currently teaching, or had taught within the last calendar year, in primary, secondary, or further education in the United Kingdom. To increase exposure on social media (LinkedIn, Facebook and Twitter) a number of professional educational sites were tagged into posts in an attempt to promote the questionnaire across a range of subject areas and educational settings. These included, the Chartered College of Teaching, local research school networks and teaching unions. Snowball sampling was also used to increase recruitment. Initial contacts and participants who had completed the research were asked to share the questionnaire link both on social media and with other contacts who met the criteria and who may also, in turn, share the link. In addition, schools in a range of local authorities across the United Kingdom were contacted by email, with a request to share the survey link with eligible teaching staff. The aim of this was to gather data, which represented a wide range of teachers working with different year groups, and with different levels of experience. By the close of the survey, in July 2021, n=467 qualifying teachers had provided some data; however, of these n=122 had only provided demographic data and were therefore excluded from the study. In total the study analysed the responses of n=345 participants, who provided both demographic data and at least one measure of attitudes towards, or understanding of, metacognition and self-efficacy. Of these n=345 participants, 75 (22%) identified as male and 267 (77%) as female. Three respondents (1%) chose not to state their gender. Most of the participating teachers worked in English schools and a majority worked either in in the secondary sector or in a secondary school that also taught further education, as shown in Table 5.1.

Table 5.1 *Geographical and school stage demographic data*

	England	N Ireland	Scotland	Wales	Primary	Secondary (up to Y11)	Secondary with sixth form (FE)	Further education
n=345	329 (95%)	7 (2%)	3 (1%)	6 (2%)	90 (26%)	110 (32%)	140 (41%)	25 (7%)

In response to the question, "Do you teach a specific subject or curriculum area?" 260 participants stated "Yes", and 85 "No". Any participants that answered "Yes" were then able to state their specialist subject. A free response was offered for this purpose, rather than a list of subjects, to ensure no subject area was excluded from the data collection. In order to test the hypothesis that teacher understanding of metacognition did not differ on the basis of subject specialism, responses were then re-coded and classified into nine different nominal subject specialism categories. Of these, 108 taught English, 24 Maths, 39 Science, 52 Social Sciences, 3 Languages, 11 Performing Arts / PE, 6 Computing and 4 taught Technology subjects. Three teachers listed Special Educational Needs as a specialism; however, as this was not a curriculum specialism it was not included within the subject categorisation. A small minority of participants (*n*=25) taught a second subject, but this was not included in the analysis. This was due in part to the small number of participants with a second specialism, but also because most of participants' second subject specialisms (*n*=19) fell within the same category as their first subject specialism, such as French and Spanish, or English and Media Studies.

Participants were also asked to state how many years they had been teaching at the time of the data collection (Range = 1–50 years; *M*=13.88, *SD*=9.25). Years of experience were categorised into 10 bands of 1-5 years, as seen in Table 5.2 .

Table 5.2 *Participants' teaching experience*

	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	45-50
n=345	74	71	66	55	43	25	6	3	0	2

5.3 Measures

In addition to the demographic data presented above, the online Qualtrics-based questionnaire also presented participants with measures of their understanding of metacognition; practice of metacognition; Continuous Professional Development (CPD) in metacognition; use of cognitive and metacognitive strategies; understanding of self-efficacy and self-use of self-efficacy in their own practice.

5.3.1 Teacher use of metacognition

Teacher use of metacognition in their own practice was assessed using Balcikanki's (2011) Metacognitive Awareness Inventory for Teachers (MAIT), as shown in Appendix C1. Balcikanki's MAIT inventory was adapted from on Schraw and Dennison's (1994) 52- item Metacognitive Awareness Inventory to create a measure that could be specifically used with teachers. Balcikanki's adaptation and validity analysis took part in three stages. In the first stage, after an extensive a review of the literature, the inventory was reduced to 42 items and these items were modified so that they explicitly referenced teaching. For example, the item, "I ask myself periodically if I am meeting my goals" was amended to "I ask myself periodically if I meet my teaching goals strategy when I am teaching." For the next part of this stage, the 42 items were given to five experts to evaluate and the questionnaire was piloted with n=323 student English Language Teachers (ELTs) and the data was factor analysed. This stage of measure development removed a further six items from the inventory because they did not align with factor structure. The 36-item questionnaire was sent to the same five experts for further feedback and the agreed items were tested with n=226 student teachers. Following another factor analysis, another 12 items were removed. In the final stage, the 24 items were given to n=125 student teachers and as all items related to one of the six factors they were included in the final inventory.

This adapted MAIT is a list of 24 statements designed to assess teachers' understanding of their own metacognitive practices, and is subdivided into six different factors. Questions include: "I am aware of the strengths and weaknesses in my own teaching"; "I am aware of what teaching techniques I use in class" and "I know when I teach which technique I use will be most effective." Teachers self-rate responses using a 5-point Likert scale, which range from "strongly disagree" to "strongly agree". Participants that did not complete at least 18 items of this scale were removed from this part of the study (n=56). Completion of a minimum of at least 18 items was required to maintain the integrity of the original scale as much as possible. A reliability analysis was carried out on the task value scale, within the remaining sample (n=289), comprising all 24 items. Cronbach's Alpha demonstrated that the measure used reached good reliability, α=0.85.

5.3.2 Teacher understanding of metacognition.

Participants' understanding of metacognition was measured in two ways. The first was with a single item developed for the current study, "How well do you understand the term metacognition in relation to teaching?" This item allowed teachers to self-rate their own understanding of the word using a 5-point Likert scale, which ranged from 1, representing "expert understanding" to 5, representing "no understanding". To further explore teacher understanding of the term, participants were asked to provide an explanation in their own words in response to the question, "What do you understand the term metacognition to mean?" Of n=345 participants, n=290 responded to these items. A further aim of asking participants to freely respond to the question, "What do you understand the term metacognition to mean?" was to discover if there are common words or definitions that teachers use to explain a shared understanding of the term. In order for a metacognitive approach to teaching to be successfully applied across a range of curricula and schools, it would be beneficial for educators to employ

a clear lexical framework that is understood by both the teacher and the student, but is not subject specific. To date, no study has explored teachers' understanding of the term metacognition, so this question was also developed and included to investigate whether a shared metacognitive lexical framework exists within the UK teaching profession.

5.3.3 Teacher training in metacognition

Participants were asked to state if they had taken part in any metacognition Continuous Professional Development (CPD), using any of these five methods: whole-school (in house) face-to-face training; face-to-face training course or whole-school workshop with an external provider; online training course with an external provider; face-to-face conference with an external provider, and personal reading and research. They were able to select all options that applied to them or record that they had undertaken no CPD in metacognition. This data was also coded so that participants who had received no metacognition training were scored as 0 and those who had received every method as 5. This was to test the hypothesis that teacher understanding of metacognition would differ depending upon the amount of training teachers had received.

5.3.4 Teacher use of self-efficacy

Participants' use of self-efficacy in their teaching practice was measured to test the hypothesis that higher levels of use of self-efficacy are associated with higher levels of use of metacognition in teachers when considering their own practice. Teacher self-efficacy (TSE) was measured using the reduced Teacher Self-Efficacy Scale (Schwarzer et al., 1999). This is a 10-item scale (Appendix C2) which has been found to be internally reliable with a retest value of α=0.76. The scale was adapted by Schwarzer et al. from their original 27-item Teacher Self-Efficacy Scale to create an efficient and condensed version of the larger scale, which still

included the four main sections of job skills in teaching (Schwarzer & Hallum, 2008). The scale was predicated upon Bandura's work into cognitive theory (1997); consequently, all measures include the word "I" (to reflect an individual's personal beliefs); verbs such as "can" or "able" (to reflect their belief in their capacity to complete the task); and challenging activities (as an easy task would not challenge their efficacy belief). The Teacher Self-Efficacy Scale was designed to assess four sets of job skills in teaching: job accomplishment; skills developed in the job; social interaction with students, parents and colleagues, and coping with job stress. Questions include: "I am convinced that I am able to successfully teach all relevant subject content to even the most difficult students" and "I know that I can carry out innovative projects even when I am opposed by sceptical colleagues." Participants self-rated on a 4-point Likert scale, which ranged from "not at all true" to "exactly true".

Participants, in this study, who had not completed all 10 items in this part of the questionnaire (n=38) were removed from this section of the analysis in order to maintain the integrity of the scale (Schwarzer & Hallum, 2008) leaving a remaining sample group of n=307. A reliability analysis was carried out for the current study, comprising all 10 items, using the qualifying sample for this (n=307). Cronbach's alpha demonstrated that this measure reached good reliability, α=0.82.

5.3.5 Teacher understanding of self-efficacy

Participants' understanding of self-efficacy was measured using a single item developed for the current study, "How well do you understand the term self-efficacy in relation to teaching?" This item allowed teachers to self-rate their own understanding of the word using a 5-point Likert scale, which ranged from 1, representing "expert understanding" to 5, representing "no understanding". Although participants were also asked to explain what they understood the term to self-efficacy mean, as the survey presented a valuable opportunity to collect this data,

a lexical analysis of this was not conducted for the purpose of this study. This was because metacognition was the primary focus of this thesis.

5.3.6 Explicit teacher modelling of strategies in the classroom and online.

Initially, this section was designed solely to investigate the theory that teachers with higher levels of understanding of metacognition and use of metacognition in their practice reported more frequent explicit teaching of metacognitive and cognitive strategies to students in the classroom. However, prior to, and during the course of, data collection for this study the move from classroom teaching to remote online teaching (as necessitated by the national lockdowns of schools during the Covid-19 pandemic) meant that participants had delivered lessons both in the classroom, and via remote learning platforms. To our knowledge, there is no existing questionnaire measuring teacher use of metacognitive and cognitive strategies in both classroom teaching and remote synchronous teaching via online learning platforms, or on the difference that these two different methods of delivery have on how often metacognitive and cognitive strategies were explicitly modelled in either scenario. Therefore, the questionnaire was adjusted to create the opportunity to ask teachers about how frequently they modelled these strategies in their online teaching as well as in a more traditional classroom scenario.

To investigate if there were any differences between these modes of delivery, participants were asked to state how often they explicitly modelled different metacognitive and cognitive strategies when teaching both in face-to face in the classroom and face-to-face via an online platform (that is, synchronous online teaching). The strategies were categorised into five different areas: planning; student self-assessment; creating model answers; time management, and memorisation. One statement was devised for each category and teachers were asked to self-rate how frequently the statement related to their explicit modelling of the strategy in both classroom and synchronous online teaching scenarios. For example, to assess how often

teachers explicitly modelled self-assessment strategies they were asked both how often they used this in their classroom teaching and how often in their online teaching. Thus, they were asked to rate: "**In my face-to-face classroom teaching** … I model students specific strategies for THEM to use when self-assessing their work (eg.2 stars and a wish; WWW/EBI; traffic lights)" and "**In my face-to-face online teaching**… I model students specific strategies for THEM to use when self-assessing their work (eg.2 stars and a wish; WWW/EBI; traffic lights)." To signpost the differences between the two different versions of the statement, participants first completed a section headed "Face-to-Face Classroom Teaching" where they responded to all five statements in relation to classroom teaching. They then completed the "Face-to-Face Online Teaching" section where they completed the moderated five statements in relation to teaching via an online platform. A total of *n*=81 participants were excluded from analyses using this measure as they either did not answer any questions within this section, or did not give responses to both measures for all ten statements (five in each section).

Responses were measured using a 5-point Likert scale, ranging from 1, "I frequently explicitly model this" to 4, "I never explicitly model this". A fifth response option of "I never model this, but I give students the information*."* was also included. This was to test the hypothesis that some teachers would give out strategy materials to students (such as information a how to structure the plan of an essay), but would not explicitly model to their students how to use the strategies, and that this would occur more often when they were using online learning platforms then when they taught in a classroom. For the purposes of analysing participants' use of strategies, the fourth and fifth items were added together to calculate how many teachers in total never explicitly modelled cognitive strategies in their general practice, as just handing out materials about the strategy did not qualify as explicit modelling. However, fifth item data was analysed separately when calculating differences in frequency usage of cognitive strategies between teaching in the classroom and teaching online, as shown in Table

5.5. Finally, participants were asked to provide an open response to the question, "What (if any) impact does the difference in face-to-face teaching in the classroom and online face-to-face teaching have on your ability to be able to teach effectively?" This was included so teachers could specify if they found one method of delivering learning more effective that the other, and the impact that they perceived these differences to have had on the efficacy of their teaching.

5.4. Procedure

Initially, the survey was scheduled to be administered in September 2020. However, the closing of schools due to the Covid-19 pandemic in March 2020 meant that most teachers who qualified for the survey had not taught students face-to-face in a classroom for over 6 months and many teachers rapidly needed to adapt their teaching so that it could be delivered via online platforms, such as Zoom and Microsoft Teams. For this reason, the collection of data for the study was delayed until January 2021, to give teachers the opportunity to re–familiarise themselves with working with students in a face-to-face classroom environment, before asking them to participate. Although the original plan was for the questionnaire to remain open for 8 weeks this was extended for a further 18 weeks to allow for the recruitment of more participants.

5.4.1. Pre-registration

This study was pre-registered on the Open Science Framework (OSF) to aid openness, clarity and future replication. Pre-registration with the OSF allowed for the study design, research aims, hypotheses, data collection procedures and analytical plan to be documented before the data collection and thus reduce the potential for creating confirmation bias when creating hypotheses. The study pre-registration documented the five original research questions designed for this study and can be seen at https://archive.org/details/osf-registrations-vx7nr-v1.

5.5 Analysis

How much do teachers understand about metacognition and does this differ on the basis of participation in relevant CPD, teaching experience, subjects taught, Key Stages taught, gender or geographical region of the United Kingdom?

Teachers were asked to self-rate how well they understood the term metacognition. “Expert” understanding was scored as 1 and “no" understanding as 5. After identifying their level of understanding of each term, participants were also asked to provide a free response to demonstrate their understanding, where they explained what they thought metacognition meant. Explanations were also coded to explore if explanations reflected self-rated understanding A categorisation matrix (as shown in Figure 5.1) was developed to analyse participants’ free response explanations of their understanding of the term metacognition. This was created so that participants’ understanding of metacognition could be compared to their explanations of metacognition and also to investigate if there was a common vocabulary used by teachers to explain the concept of metacognition. Responses in the matrix were coded by assigning them to Deductive Categories that were developed based on an initial reading of these responses. Deductive Categories were linked to the Likert scale responses participants selected when identifying their level of understanding. These ranged from 1 to 5; “expert understanding” was scored as 1 and “no understanding” as 5.

Figure 5. 1 *Metacognition Categorization Matrix*

Deductive category	Category content	Examples
I have an **expert** understanding of the term metacognition.	A broad and deep definition of the term, metacognition, which may refer to specific research and / or the etymological roots of the term.	"mediational processes of information whether new or from memory that requires self-reflection and hence analysis with a view to change or maintain view/s, decisions or behaviour (assimilate / accommodate)" "agree with Flavell's model. Strategies/ goals and knowledge interacting" "I use the EEF's definition of metacognition…there are multiple conceptually related concepts including self-regulation and executive function"
I have a **good** understanding of the term metacognition.	A clear and developed definition of the term, metacognition, which may refer to more than one of the different elements of the metacognitive process (plan, select, monitor evaluate, reflect).	"the knowledge and strategies to plan, monitor and evaluate learning" "the thinking process of being able to plan, evaluate and execute the task set" "a concept that is more than memory in learning and that is enhanced by intervention of learning strategies according to individual needs, ability and differences"
I have a **reasonable** understanding of the term metacognition.	A clear definition of the term, metacognition, which may refer to self-awareness and / or control as an aspect of metacognition. It may also include "how" as an indicator of metacognition relating to a process.	"awareness of thought processes" "critically evaluating your own thinking" "knowing about the cognitive process of learning" "learning about learning processes, being aware of yourself as a learner" "pupils being aware of their own learning"
I have a **limited** understanding of the term metacognition.	A brief definition of the term, which may refer to thinking and / or other key terms, but does not expand upon them.	"a thought process" "thinking about thinking" "learning how we learn" "recognising and using different styles of learning" "the way we learn" "higher level thinking"
I have **no** understanding of the term metacognition.	A one-word, or incorrect definition, or a response indicating no understanding of the term.	"thinking" "don't know" "how much anyone can hold in their working memory at one time" "non-permanent understanding"

Criteria were then developed for each of the five categories and these criteria were placed in the Category Content section of the matrix to help the researcher assign each response to the most appropriate category. For example, the criteria developed for the Deductive Category of "expert understanding" was, "a broad and deep definition of the term,

metacognition, which may refer to specific research and / or the etymological roots of the term." To further help with categorisation of responses, a minimum of three examples of participants' responses for each category were also included in the Examples column of the matrix. The Metacognition Categorisation Matrix criteria were then applied to the data so that free response data could be further analysed for levels of understanding.

An analysis of lexical frequency was also conducted to establish if the teachers participating in the survey employed any common words or phrases when freely responding to the question. When calculating lexical frequency, words which were used to help connect phrases, or assist solely with syntax, were removed from the data analysis. This included coordinating conjunctions, such as "and" and "or"; the article "the", and the indefinite article "a". Although each word was counted separately, words with the same root word, such as "learning", "learned" and "learn" were grouped together when calculating individual lexical frequency as they were deemed to belong broadly to the same semantic field.

A series of one-way ANOVAs were used to test whether teachers' self-rated understanding of metacognition (so whether they had been categorised as an expert or as having a good, reasonable, limited or no understanding) differed depending on: experience; participation in metacognition CPD; gender identity; geographical location, curriculum specialism or Key Stages taught.

Are higher levels self-reported understanding of metacognition and use of metacognition associated with higher levels of understanding of self-efficacy, and higher levels of use of self-efficacy for teachers when considering their own practice?

A simple linear regression model was used to explore whether teachers with a higher understanding of metacognition are associated with higher levels of understanding of self-efficacy.

A simple linear regression model was used to explore whether teachers with higher self-reported, use of metacognition are associated with higher levels of use of self-efficacy. In order to run this analysis, a mean score was calculated for each participant for both use of metacognition and use of self-efficacy. Any subsequent data analyses of the use of either metacognition or self-efficacy also used these mean score calculations.

Are higher levels of self-reported understanding of metacognition associated with higher levels of use of metacognition for teachers when considering their own practice?

A simple linear regression model was used to test the relationship between teachers' self-rated understanding of metacognition and their use of metacognition .

Are higher levels of self-reported understanding of metacognition or use of metacognition when teaching associated with more frequent explicit modelling of metacognitive and cognitive strategies to students in both classroom and online teaching?

A simple linear regression model was used to determine if teachers with higher levels self-reported, self-use of metacognition were associated with more frequent explicit teaching of metacognitive and cognitive strategies to students.

Is there a difference in the type, or frequency, of explicit modelling of metacognitive cognitive strategies between teaching in the classroom and teaching via online platforms?

A two-way ANOVA was used to explore if teachers demonstrated higher levels of the explicit teaching of strategies in face-to-face teaching in the classroom compared to face-to-face teaching via online platforms.

5.6 Ethics

In their paper exploring the ethical issues of online surveys, Roberts and Allen (2015) identified five ethical issues concerning their use in educational research. There were: dual teacher / researcher roles; informed consent; use of incentives; privacy, anonymity and confidentiality; and data quality. The teacher /researcher roles issue was not a factor in this study as, although the researcher was a qualified teacher, the survey was solely for teachers and, therefore, did not require any students they taught to complete the questionnaire. To ensure all participants were able to give informed consent, they were given information about the study and its purpose before they completed the questionnaire (as shown in Appendix C3). The questionnaire was also designed so that it was not possible for them to continue with the survey until they had checked a box to show that they had read this (Mahon, 2014). No incentives were given for taking part in the survey, which also meant that participants did not have to give any identifiable data, such as names and contact details, to claim an incentive. To ensure that teachers could not be identified, participants were also informed that their data would remain anonymous; however, they were also notified and that in submitting the questionnaire they were agreeing to their data being included in the study. Before beginning the survey, teachers were asked, "Do you consent to take part in this research project?" and were only able to continue the survey after they had checked the "Yes – I consent" box. Three respondents selected, "No – I do not consent" and were exited from the questionnaire as a result. Although the first section of the survey asked educators information about background and demographic variables this did not render any of the teachers identifiable. Participants were notified that they were free to leave any of the questions unanswered, or to stop completing the questionnaire at any point. They were also made aware that once the questionnaire had been submitted their data could not be withdrawn as it was anonymous and there was no way to identify it, so that it could be removed from the study.

Finally, survey fatigue was considered during the both the design of the questionnaire and the information about the survey that was share on social media posts and emails promoting the survey. As the questionnaire took approximately 15-20 minutes to complete, the information about the time required to work through all the questions was included in all materials promoting the questionnaire and on the information sheet at the start of the questionnaire. This was included to ensure that teachers were aware of how long it would take them to complete the questionnaire, so they knew how much time to set aside to complete it. Although inclusion of this information may have deterred some teachers from completing the survey, the inclusion of completion timings was considered necessary to increase transparency and help reduce only partial completion of the questionnaire by participants. As stated, some participant responses were removed from the data analysis as not all the items had been responded to, such as the MAIT items. Although it was possible to design the questionnaire so that items could not be skipped, this would have meant that participants were effectively being pressed into responding to every item. Research in this field (Baker, 2012; Mahon, 2014) has suggested that this may breach informed consent as participants have no choice but to complete the items. There is also the possibility that this approach may increase dropout rates (Paine et al., 2007; Stieger et al., 2007) if participants choose to leave the survey rather than complete every item. Therefore, to encourage respondents to complete all questions without compelling them to do so, prompts were included to remind teachers to complete any incomplete responses before moving on. Ethical approval to run the study was also sought and granted by the Department of Education Ethics Committee at the University of York.

5.7 Results

How much do teachers understand about metacognition and does this differ on the basis of participation in relevant CPD, teaching experience, subjects taught, Key Stages taught, gender or geographical region of the United Kingdom?

Teachers were asked to self-rate how well they understood the term metacognition. These scores, shown in Table 5.3, demonstrated that most participants rated themselves as having a "good" understanding of metacognition; however, written explanations of the term showed that most teachers had a "reasonable" understanding.

Table 5.3 *Teachers' self-reported understanding of metacognition*

Understanding of	"Expert"	"Good"	"Reasonable"	"Limited	"None"
Metacognition (self-rated)	18	139	86	36	11
(*n*=290, M=2.60)	6%	48%	30%	12%	4%
Metacognition (explanation)	9	47	165	49	17
(*n*=287, M=3.06)	3%	16%	57%	17%	6%

(1=*expert*, 5 = *none*)

Overall, the results show that the majority of participating teachers rated themselves as having a reasonable or higher understanding of metacognition (84%). Similarly, a majority of teachers also demonstrated an understanding of metacognition coded as reasonable and above (77%) in their explanations of the term. However, teachers' self-rated understanding of metacognition was generally higher than the understanding demonstrated in metacognition explanations, with the main disparity found between the categories of good and reasonable.

A lexical frequency analysis also found shared words used by teachers to articulate their understanding of metacognition. The two most frequently used words (thinking and learning) both relate to the cognition aspect of metacognition, while the other three words in the top five (how, about and process) could be perceived as relating to the meta aspect of the term. Although in isolation the phrase, "thinking about thinking" was coded as demonstrating only a limited understanding of metacognition within the categorisation matrix, its lexical

frequency within participants' explanations suggest that it is a phrase which permeates pedagogical vocabulary.

These results suggest that a minority of participants (4%) claimed to have no understanding of metacognition. This was also supported by free-response explanations with 6% demonstrating no understanding, or an incorrect understanding of the term. A minority (6%) also professed to have expert understanding, but only 3% actually demonstrated this expertise when clarifying what they understood metacognition to mean. The majority of teachers considered themselves to have either a good or reasonable understanding (78%), which was also maintained by their explanations (74%). However, the greatest disparity between understanding and explanations was found between these two categories. Although the majority of participants considered themselves to have a good understanding of metacognition (48%), explanation responses indicated that only 16% had a good understanding. In contrast, the majority of explanations showing a reasonable comprehension in their explanations (57%) compared to a self-rated understanding of just 30%. In summary, there are signs that teachers may have over-estimated how well they understand metacognition.

Explanations were also analysed at a lexical level to investigate whether there is a shared vernacular, of words and phrases that participants used to articulate their understanding of the term. The lexical data presented in Table 5.4 demonstrates that there was evidence of a shared vocabulary used by participating teachers to explain metacognition. Of these, the most frequently used single words related to variations of "thinking" and "learning". However, in regard to the list of most frequent words used, "monitor" was the only word in the top ten that related to a specific stage in the metacognitive process, rating in tenth place.

Table 5.4 *Lexical frequency within metacognition explanations*

Words used to describe "metacognition"	Frequency
thinking, think, thought	269
learning, learned, learn, learns	197
how	125
about	104
process, processes	103
understanding, understand	101
knowledge, knowing, know	57
awareness, aware	48
strategies	36
monitor	27

***** *Note: these figures have been adjusted to exclude words which only assisted syntactic structure.*

The exact phrase, "thinking about thinking", was used by 52 participants (18%). increasing to 66 (23%) when extended to include minor variations, such as "think about your own thinking"; "think about my thinking" and "thinking about your own thought processes". Of these, 18 (6%) only used this phrase, or a minor variation, with no other explanation. Although this can be considered a broad, and somewhat simplistic explanation of metacognition, the frequency of usage suggests a shared phraseology within the sample group. Single words that demonstrated a more sophisticated understanding of metacognition as a cognisant process (how, process, aware, monitor) also ranked highly in teachers' shared vocabulary. However, these words appeared less frequently in the data suggesting that either fewer teachers understood this aspect of metacognition, they chose not to include it in their explanation. This may also explain why most explanations were categorised as reasonable, rather than good, or excellent.

A one-way independent ANOVA was used to assess whether higher levels of training in metacognition were associated with increased self-reported teacher understanding of metacognition (not the objective rating coded from participants' explanations of metacognition). "Expert" understanding was scored as 1 and "no" understanding as 5;

therefore, the lower the mean value the higher the level of metacognitive understanding. Teachers who received no Continuous Professional Development training in metacognition were scored as 0, and teachers receiving all five different types of training as 5. Participants' understanding of the term "metacognition" increased depending on the amount of Continuous Professional Development they had experienced (*n*=287). , (*n*=51, M=3.73, SD=1.00), to one type of CPD (*n*=133, M=2.54, SD= 0.69), to two types (*n*=54, M=2.30, SD=0.63), to three types (*n*=30, M=2.10, SD=0.40), to four types (*n*=11, M=1.82, SD=0.75), to five types (*n*=8, M=1.5, SD=0.54). However, Levene's Test of Homogeneity of Variance demonstrated that homogeneity of variances was violated (p=<0.005) and so Welch's ANOVA was used to test whether the observed differences were statistically significant. There was a statistically significant difference in self-reported understanding of metacognition between groups with different amounts of CPD focused on metacognition, Welch's (F (42.14) =26.73, p <.001), η_p^2 = 0.39), representing a large effect size.

An independent one-way ANOVA was also used to test the hypothesis that teachers with more years of teaching experience would have higher levels of self-rated metacognitive understanding. The assumption of homogeneity of variances, as assessed by Levene's test for equality of variances (p=0.76) was not violated by the analysis. There was no significant difference in self-rated understanding of what was meant by the term "metacognition" on the basis of teaching experience (*n*=290, M=2.60, SD=0.92). A higher number of years of service did not appear to lead to a higher understanding of metacognition (F (8, 281) = 0.91, p = .50).

An independent one-way ANOVA was used to test the hypothesis that participants' understanding of metacognition was not based upon the subject areas they taught. This included English and Media (n=89, M=2.39, SD=.78), Maths (*n*=22, M=2.95, SD=0.95), Sciences (*n*=33, M=2.67, SD=0.57), Social Sciences (*n*=44, M=2.41, SD=0.95), Languages (*n*=10, M=2.60, SD=0.84), Special Educational Needs (*n*=3, M=2.00, SD=0.00), Performing Arts and

Physical Education (*n*=9, M=3.00, SD=1.19), Computing (*n*=5, M=2.80, SD=0.84) and Technology (*n*=4, M=3.00, SD=1.41) (*n*=22, M=2.95, SD=0.95). As anticipated, no statistically significant differences were found between participants understanding of metacognition (*n*=219, M=2., SD=0.90) and the main subject area they taught (F (8, 210) = 0.79, p=.0.9, η_p^2 =0.06).

A one-way independent ANOVA was run to test the test the hypothesis that there would be no significant difference between Key Stages taught and participants' understanding of metacognition. This comprised Primary (*n*=67, M=2.76, SD=0.96), Primary with Secondary (*n*=8, M=2.38, SD=1.06), Secondary (*n*=81, M=2.58, SD=0.88), Secondary with Sixth Form Education (*n*=114, M=2.59, SD=0.87) and Further Education (*n*=17, M=2.35, SD=1.17). "Expert" understanding was scored as 1 and "no" understanding as 5; therefore, the lower the mean value the higher the level of metacognitive understanding. As expected, the analysis found no significant difference in participants understanding of the term "metacognition" (*n*=287, M=2.61, SD=0.92) on the basis of the Key Stage they taught (F (4, 282) = 0.84, p=.432, η_p^2 =0.13).

A one-way independent ANOVA was used to test the hypothesis that self-rated metacognitive understanding did not differ according to gender. "Expert" understanding was scored as 1 and "no" understanding as 5; therefore, the lower the mean value the higher the level of metacognitive understanding. Within the sample (*n*=290) 77% identified as female (*n*=225, M=2.60, SD=0.89), male (*n*=63, M=2.60, SD=1.01) and 1% chose not to state their gender (n=2, M=2.50, SD=2.12). Although the unequal female to male ratio could potentially present a problem, it was also broadly representative of the uneven gender balance within the English teacher workforce. In the national teaching population 76% of teachers identify as female (UK Government, 2020), compared to 77% in the sample size. As anticipated, no

significant difference was found in metacognitive understanding on the basis of gender (F (2, 287) = 0.1, p = .99, η_p^2 = .00.

A one-way independent ANOVA was also run to test the assumption that metacognitive understanding did not differ according to the geographical location of participants. However, the uneven sample sizes were problematic here as they were too unequal and did not represent the wider teaching population. The majority of participants (95%) taught in England (n=276, M=2.58, SD=.91), compared to those teaching in Northern Ireland (*n*=7, M=3.14, SD=1.07), Scotland (*n*=2, M=2.50, SD=2.12), and Wales (*n*=5, M=2.60, SD=1.14). As expected, no statistically significant differences were found between participants' understanding of metacognition (*n*=290, M=2.60, SD=0.92) and the geographical area of the United Kingdom they lived in (F (3, 286) = 0.85, p=.467). However, given the vast difference in sample sizes, this result does not denote a meaningful comparison and was not really effective in testing the assumption that metacognitive understanding did not differ according to geographical location.

As expected, results from the statistical analysis demonstrated that, within the sample, teachers' understanding of metacognition did not differ on the basis of subjects taught, Key Stages taught or gender. However, the findings also show that there was no difference in self-rated understanding of metacognition on the basis of teaching experience, which did not support the hypothesis that teachers with more years of teaching experience would have an increased understanding of metacognition. In this respect, there was no significant difference found between participants teaching for fewer than five years (*n*=62, M=2.52, SD=0.92), than those teaching between 6-10 years (*n*=56, M=2.61), 11-15 years (*n*=56, M=2.59, SD=0.89) or 16-20 years (*n*=45, M=2.69, SD=1.0). Instead there was a slight, but not significant, decrease in teacher understanding of metacognition among participants with more years' teaching experience. "Expert" understanding was scored as 1 and "no" understanding as 5; therefore, the lower the mean value the higher the level of metacognitive understanding. The results did

find, as anticipated, that higher levels of Continuous Professional Development in metacognition were associated with increased self-reported teacher understanding of metacognition. Levels of understanding also increased incrementally in line with the amount of different types of metacognitive training participants had received from no CPD (*n*=54, M=3.73, SD=1.00) to all five types (*n*=8, M=1.5, SD= 0.54). The majority of participants (82%) had experienced at least one type of metacognitive CPD, compared to those who had experienced no metacognitive training (18%).

Are higher levels self-reported understanding of metacognition and use of metacognition associated with higher levels of understanding of self-efficacy, and higher levels of use of self-efficacy for teachers when considering their own practice?

Of *n*=328 participants, a majority of 67% (*n*=226) rated themselves as having a reasonable or above understanding of self-efficacy. Of those, only 3% of (*n*=11) considered themselves to have an expert understanding, compared to 29% (*n*=96) who scored themselves as good and 36% (*n*=119) as reasonable. Twenty two per cent (*n*=73) of participants scored themselves as having a limited understanding and 9% (*n*=29) with no understanding. "Expert" understanding of self-efficacy was scored as 1 and "no" understanding as 5, therefore, the lower the mean value the higher the level of metacognitive understanding.

A simple linear regression was conducted to test the hypothesis that participants with a higher understanding of metacognition would show higher levels of self-reported understanding of self-efficacy. Self-reported understanding of metacognition was significantly predictive of increased levels of self-reported self-efficacy in teaching F (1, 286) = 108.74, p<0.001; (β_1 =0.48, p<0.001). The effect size was medium, explaining 27.3% of the variance, R^2=27.5%.

A further linear regression was conducted to test the hypothesis that participants with higher use of metacognition would show higher levels of use of self-efficacy. Self-reported use of metacognition was statistically significant as a predictor of increased levels of use of self-efficacy in teaching F (1, 289) = 57.05, p<0.001; (β_1 = -0.37, p<0.001). The effect size was small, explaining 16.2% of the variance, R^2=16.5%.

Are higher levels of self-reported understanding of metacognition associated with higher levels of use of metacognition for teachers when considering their own practice?

A simple linear regression was run to test the hypothesis that participants with higher self-rated understanding of metacognition would show higher levels of metacognition in their pedagogical practice. The results found that participants' understanding of metacognition significantly predicted their self-reported metacognitive practice in teaching F (1,288) = 41.13, p<0.001; (β_1=0.13, p<0.001), with a small effect size explaining 11.9 % of the variance, R^2=12.2%.

Are higher levels of self-reported understanding of metacognition or use of metacognition when teaching associated with more frequent explicit modelling of metacognitive and cognitive strategies to students in both classroom and online teaching?

A simple linear regression was performed to test the hypothesis that participants with a higher level of self-reported metacognitive understanding would be more likely to explicitly model metacognitive and cognitive strategies more frequently in their classroom teaching. The results show that participants' metacognitive understanding significantly predicted a more frequent level of self-reported explicit modelling of cognitive strategies in their face-to-face classroom teaching practice F (1,281) = 37.72, p<0.001; (β_1=0.18, p<0.001). The effect size was small, explaining 11.5% of the variance, R^2=11.8%.

A simple linear regression was also performed to test the hypothesis that participants with a higher level of self-reported metacognitive understanding would be more likely to explicitly model metacognitive and cognitive strategies more frequently in their online teaching. The results show that participants' metacognitive understanding significantly predicted a more frequent level of self-reported explicit modelling of cognitive strategies in their face-to-face classroom teaching practice F (1,266) = 34.98, p<0.001; (β_1=0.31p<0.001). The effect size was small, explaining 11.3% of the variance, R^2=11.6%.

A simple linear regression was run to test the hypothesis that participants who reported higher levels of use of metacognition would also explicitly model metacognitive and cognitive strategies more frequently in their classroom-based teaching. The results show that participants' self-reported use of metacognitive practices in their teaching predicted a more frequent level of self-reported explicit modelling of cognitive strategies in their classroom teaching practice F (1,282) = 94.78, p<0.001; (β_1=0.72, p<0.001), with a moderate effect size of 24.9%, R^2=25.5%.

A simple linear regression was also run to test the hypothesis that participants who reported higher levels use of metacognition would also explicitly model metacognitive and cognitive strategies more frequently in their online teaching. The results show that participants' use of metacognitive practices in their teaching predicted a more frequent level of explicit modelling of cognitive strategies in their classroom teaching practice F (1,267) = 4.99, p<0.001; (β_1=0.93, p<0.001), with a small effect size of 14.4%, R^2=14.1%.

Is there a difference in the type, or frequency, of explicit modelling of metacognitive and cognitive strategies between teaching in the classroom and teaching via online platforms?

Teachers were asked to rate how frequently they explicitly modelled five different metacognitive and cognitive strategies in their teaching practice to test they hypothesis that

participants would explicitly model and teach these strategies more often in the classroom than when teaching via an online platform. They were asked to score each strategy based on how much they explicitly modelled the strategy to students during both their face-to-face classroom teaching and in face-to-face teaching via an online platform. Frequencies for their responses can be seen in Table 5.5. Responses ranged from "frequent" explicit modelling, to "never" modelling. An additional category was included to allow teachers to score if they gave out information about the strategies, but did not model them. This was included to check whether some participants were just handing out strategy information without modelling it in either setting.

Table 5.5 *Frequency of modelling metacognitive and cognitive strategies*

	"frequently"	"sometimes"	"rarely"	"never"	"give info"
In classroom teaching					
Teach model answers	193	82	7	2	0
(*n*=284)	(68%)	(28.9%)	(2.5%)	(0.7%)	
Teach planning strategies	162	107	12	1	1
(*n*=283)	(57%)	(37.8%)	(4.2%)	(0.4%)	(0.4%)
Teach self-assessment strategies	130	111	32	10	0
(*n*=283)	(45.9%)	(39.2%)	(11.3%)	(3.5%)	
Teach time management strategies	109	129	38	6	2
(*n*=284)	(38.4%)	(45.4%)	(13.4%)	(2.1%)	(0.7%)
Teach memorisation strategies	121	109	44	7	3
(*n*=284)	(42.6%)	(38.4%)	(15.5%)	(2.5%)	(1.1%)
Via online platform					
Teach model answers	149	92	13	5	10
(*n*=269)	(55.4%)	(34.2%)	(4.8%)	(1.9%)	(3.7%)
Teach planning strategies	86	120	28	17	17
(*n*=268)	(32.1%)	(44.8%)	(10.4%)	(6.3%)	(6.3%)
Teach self-assessment strategies	76	105	49	26	12
(*n*=268)	(28.4%)	(39.2%)	(18.3%)	(9.7%)	(4.5%)
Teach time management strategies	61	116	55	19	18
(*n*=269)	(22.7%)	(65.8%)	(20.4%)	(7.1%)	(6.7%)
Teach memorisation strategies	70	109	55	18	16
(*n*=268)	(26.1%)	(40.7%)	(20.5%)	(6.7%)	(6%)

The frequencies displayed in Table 5.5 show that there was a difference in how often participants said they explicitly modelled teaching, dependent upon whether they were teaching in the classroom or via online platforms. All strategies were used more often by teachers when

teaching in a classroom scenario compared to when using online platforms. Of these, the strategy most frequently used by participants, in both classroom (68%) and online teaching (55%), was explicitly teaching model answers. In contrast, time management skills were explicitly taught least frequently in both classroom (38%) and online (23%) scenarios. Overall, more participants either never explicitly modelled metacognitive and cognitive strategies, or gave out strategy materials but did not model them, when teaching online than they did when teaching in the classroom. For example, when teaching planning strategies 34 (13%) of participants responded that when teaching online they either never modelled this strategy, or just handed out the strategy information, compared to 2 teachers (1%) that never modelled, or just gave out information when teaching in the classroom.

Participants' were also able to give a free responses to the question, "What (if any) impact does the difference in face-to-face teaching in the classroom and online face-to-face teaching have on your ability to be able to teach effectively?" This gave them the opportunity to explain any impact they felt the differences between face-to-face classroom and online contexts had on their teaching and was asked to help us understand the finding about why some teachers might explicitly model metacognitive and cognitive strategies more in a classroom than when teaching online. From the sample, *n*=168 of participants did not give a response to this question, while *n*=177 did. Specific teacher comments relating to their experiences of explicit teacher modelling of metacognitive and cognitive strategies have been included as part of the discussion section (Section 5.8).

5.8 Discussion

Overall, results from the study sample indicated that most participants had good or reasonable understanding of metacognition and that understanding of metacognition was not related to: gender, geographical location, Keys Stages or subjects taught, or teaching experience.

However, the number of CPD opportunities teachers had participated in did appear to be a significant predictor of participants' understanding of metacognition. A common lexical framework that teachers used to describe metacognition emerged from the data with words relating to thinking and learning appearing most frequently. The results also showed that participants with higher levels of understanding and use of metacognition in their own practice were more likely to self-report higher levels of understanding of self-efficacy and use of self-efficacy in their own practice. Furthermore, participants' understanding of metacognition significantly predicted their use of metacognition in their own practice. Teachers with higher levels of understanding and use of metacognition in their practice were also more likely to explicitly model metacognitive and cognitive strategies in their teaching. Finally, participants modelled metacognitive and cognitive strategies more often when teaching in the classroom than when teaching online.

How much do teachers understand about metacognition and does this differ on the basis of participation in relevant CPD, teaching experience, subjects taught, Key Stages taught, gender or geographical region of the United Kingdom?

Research suggests that teaching students a metacognitive approach to learning can help improve their academic attainment (Braund & DeLuca, 2018; Flavell, 1979; Hacker et al., 1998, 2009; Perry et al., 2018; Quigley et al., 2018; Veenman et al., 2006). Research further indicates that teachers play an important role in helping students develop their metacognitive skills (Perry et al., 2018; Quigley et al., 2018; Wilson & Bai, 2010). Therefore, it appears logical that teachers who have a clearer understanding of the metacognitive process and how it can be used in learning are those best placed to be able develop their students' understanding and use of the metacognitive process in the classroom. This study found that the majority of participant explanations showed at least a "reasonable" understanding of metacognition. The

study also found that there was no association between participants' understanding of metacognition and the number of years of teaching experience they had, the Key Stages or subjects they taught, or their gender. The vast difference in sample sizes meant that it was not possible to meaningfully analyse any associations between metacognitive understanding and geographical data. However, the findings from the current study did suggest that teachers with higher levels of metacognitive training showed higher levels of metacognitive understanding. Although the study found that the majority of participants believed themselves to have a self-rated reasonable or higher understanding of metacognition, of the 48% of participants that considered themselves to have a good understanding of metacognition only 16% demonstrated this level of understanding in their objectively-rated explanations. It is possible that this disparity is the result of participants not including all of their knowledge about metacognition in their responses. This may suggest that some participants could have either overestimated their knowledge of the term, or not given a definition that reflected their breadth of understanding.

It may also be the case that participants' in depth understanding of metacognition was moderate and more targeted training was required to develop a deeper expertise. A potential lack of depth was reflected in the vocabulary used by some participants to articulate their understanding of metacognition. Participants' free response explanations of metacognition showed that there were some words and phrases frequently used by teachers to describe the concept, such as "thinking about thinking." Although, this could suggest the beginnings of a common lexical framework used to write about and discuss metacognition, most of the frequently used words and phrases did not reflect an expert understanding of the concept. The most commonly used words, "thinking" and "learning", and the repeated common phrase, "thinking about thinking", were coded as demonstrating only limited understanding within the categorisation matrix (unless supported with a more extended explanation, which articulated a

higher level of understanding). Metacognition is 4-part process (working symbiotically with a self-regulatory process), which is more than just "thinking about thinking". Although it could be argued that a limited metacognitive understanding is preferable to no metacognitive understanding, there is the danger that over-simplification, or lack of a comprehensive understanding about metacognition could lead to educators teaching and practicing the process with minimal impact. As noted in the EEF's evidence review of the application of cognitive science in schools (2021), teacher understanding of theoretical concepts can affect effective implementation in the classroom. Thus, a "reasonable" understanding may not be enough to successfully guide learners into adopting a metacognitive approach in the classroom. This may lead to lethal mutations where the practical application in the classroom is not informed by the metacognitive theory that underpins it. The EEF's guidance report on metacognition (2018) stated, as its first recommendation, that teachers need to develop a professional knowledge of the concept in order to teach metacognition to students. Furthermore, its final recommendation was for schools and senior leaders to provide teachers with both the time, Continuous Professional Development, and resources to develop this understanding. The results from this study suggest that the amount of Continuous Professional Development in metacognition that teachers participation in this training in appears to benefit them and that the more opportunities they have to participate in this, the higher their understanding of metacognition. It may also be that "good" metacognitive understanding could be instilled though teacher training programmes (Duman & Semerci, 2019) to help teachers develop both their own metacognitive pedagogical practice and help them foster a metacognitive approach to the students they teach (Wall & Hall, 2016).

There is some evidence to suggest that teachers with more experience may be more effective in the classroom leading to improved student outcomes and learning (Kini & Podolsky, 2016), although this is a complex and nuanced relationship (Graham et al., 2020;

Irvine, 2019). Research by Stewart et al. (2007) also posited that metacognition in teachers increased considerably with age and teaching experience, based on their study of experienced teachers working towards a Master's degree. However, although the mean years of teaching experience for graduate students was 8.5, the study did not measure the difference between graduate teachers that had more years of service than less experienced teachers. Furthermore, participants were all teachers studying for a Master's degree and so were not representative of the teaching population as a whole. The current study sought to investigate this difference and hypothesised that more experienced teachers with higher numbers of years of service would demonstrate an increased understanding of the term metacognition. However, as with Stewart et al. (2007), increased teaching experience was not associated with a greater metacognitive understanding. Furthermore, findings also showed that there was no statistically significant association between teachers use of metacognition and the amount of time they had been teaching for. This suggests that adopting a metacognitive approach to teaching is not something that simply evolves from increased pedagogical experience, but is rather a concept than needs to be learned, developed and practiced.

As the current study hypothesised, teacher understanding of metacognition did not differ on the basis of either the Key Stages or subject specialisms they teach. This could suggest that there is no specific curriculum specialism or stage where teachers demonstrate or employ a greater understanding of metacognition. This could be because metacognition is a process that can be taught and developed by students in different subject areas (Quigley et al., 2018) and years groups (Dignath et al., 2008) so teachers do not need to teach it to students in a particular subject area, or developmental stage. Extended research with a larger, school-based, participant groups could explore if these findings can be replicated within the general teaching population. If there was no correlation between years of service, Key Stages taught, or subject specialism and educators' metacognitive pedagogical practice it may be that future research

further investigates the potential impact of developing teacher knowledge through explicit metacognitive training irrespective of Key Stage or subject specialism. Moreover, if metacognition can have a beneficial effect on student outcomes (Perry et al., 2018) and can be taught effectively to younger, primary school pupils (Dignath et al., 2008), there is an argument for ensuring that adopting a metacognitive approach in the classroom (and thus effective teacher training in metacognition) should begin in primary school. However, this does not mean that only primary school teachers should develop expertise in metacognition. In order for students' metacognitive skills to develop and flourish, as they progress through school and explore different subjects, teachers in all stages and curriculum areas should also be proficient in fostering a metacognitive approach to learning in much the same way that teachers are required to develop proficiency in formative and summative assessment or differentiation. This study's results suggest that metacognition-focussed Continuous Professional Development may be a strong evidence-informed approach to achieving this.

Are higher levels self-reported understanding of metacognition and use of metacognition associated with higher levels of understanding of self-efficacy, and higher levels of use of self-efficacy for teachers when considering their own practice?

The current study's results show that participants who scored higher in self-reported understanding of metacognition were more likely to self-rate higher scores of understanding of self-efficacy when considering their own practice, although this had a small effect size. This is noteworthy as research suggest that teachers with higher levels of self-efficacy can have a positive impact on student attainment (Klassen & Tze, 2014; Mojavezi & Tamiz, 2012). Furthermore, teachers with higher self-efficacy beliefs tend to perceive themselves as being more capable of being able to teach and motive more challenging students (Gibson & Dembo, 1984) and more likely to persevere with teaching challenging students (Tschannen-Moran &

Hoy, 2001). This may be because teachers with higher levels of self-belief about their ability to develop students' learning may also perceive themselves as having a greater sense of agency in the classroom (Zee & Koomen, 2016) and thus more control over the impact they have on student progress. Teachers who demonstrate a higher level of understanding about metacognition also are more likely to be aware of how learning and control of learning can be effectively fostered within students through the metacognitive process and feel more able to help students progress. Therefore, it is not inconceivable that teacher understanding of the metacognitive process could mediate teacher self-belief in how effective they are in the classroom.

Additionally, results from this study also show that participants that scored higher levels in use of metacognition were also more liable to demonstrate higher use of self-efficacy in their pedagogical practice with a small effect size. It may be, therefore, that effective metacognitive strategies, such as explicitly modelling teacher (expert) thought processes to students (novices) when demonstrating how to tackle an academic task successfully may also help develop teacher self-efficacy, as when doing so they are reinforcing their own competency through a demonstrations of their expertise.

Are higher levels of self-reported understanding of metacognition associated with higher levels of use of metacognition for teachers when considering their own practice?

Results from the study indicated that there was a positive association between participants' understanding of metacognition and their use of metacognition in their practice, although the effect size was small. This indicates that teachers that have more knowledge about metacognition may also apply a metacognitive approach to their own teaching and that teachers with a higher level of metacognitive understanding tend to use a more metacognitive approach in their pedagogical practice. This suggests that there could be merit to developing teachers'

expertise in this field. This could be potentially beneficial in helping teachers develop their own metacognitive practice and that of their students. The Stages of Metacognitive Engagement developed by Wall and Hall (2016), as part of their research into the use of metacognitive role models, posited that awareness of learning as a process was the first stage of teachers and students developing metacognitive knowledge. This stage of Procedural Metacognitive Knowledge involves teachers developing an awareness (and a shared language) for discussing cognitive processes. In the Categorisation Matrix developed for the currently study the criteria for a "reasonable" objective understanding of metacognition was, "a clear definition of the term metacognition, which may refer to self-awareness and/ or control as an aspect of metacognition. It may also include "how" as an indicator of metacognition relating to a process." It may be that participants categorised as having a "reasonable" or above objectively rated understanding of metacognition could be considered to be at this stage. Once teachers have this initial understanding they can then build on it to using metacognition in their own practice. Teacher understanding of metacognition and how it could be used to develop a metacognitive approach was a key aspect of Wall and Hall's Stages of Metacognitive Engagement and the transfer from reflecting on knowledge to using metacognitive practices in the classroom was classified in the third stage, defined as of Procedural Metacognitive Skilfulness. In Wall and Hall's model, teachers and students can work through the stages together; however, there is some research to suggest that increased teacher modelling of the metacognitive process can support students to develop their own metacognitive thinking (Branigan & Donaldson, 2020). The results from the current study suggest that developing teachers' understanding in metacognition may lead to increased use of metacognitive thinking and practices in their teaching.

Are higher levels of self-reported understanding of metacognition or use of metacognition when teaching associated with more frequent explicit modelling of metacognitive and cognitive strategies to students in both classroom and online teaching?

Results demonstrated that participating teachers' understanding of metacognition and use of metacognition were associated with more frequent modelling of metacognitive and cognitive strategies in both classroom and online teaching. However, the effect size was highest for teacher use of metacognition explicitly modelling the strategies in a classroom environment (R^2=24.5%). This shows that although teachers with higher-self-rated understanding of metacognition are more likely to explicitly model these strategies to students in both classroom and online scenarios than teachers with lower scores, it appears they are more likely to do this in the classroom if they also use metacognitive strategies in their own practice.

In part, this may be a reflection of the difference that exists between the "knowing-doing" gap, which is posited to exist within education (Christodoulou, 2017) and other sectors, such as business, (Pfeffer & Sutton, 2000). The knowing-doing gap is the difference that exists between knowing something (such as the theory underpinning metacognition, or the knowledge that all sentences should begin with a capital letter) and applying it in practice. Although there are numerous textbooks, blogs and resources, such as the EEF's guidance report (2018), to help teachers understand the concept of metacognition alongside worked examples of how the theory can be used in the classroom, these results suggest that it is the application of metacognitive practices (rather than knowledge alone) that has the greater impact on strategy modelling. This may because teachers that are more metacognitive in their practice are more likely to articulate strategies than teachers who are simply cognisant of the theoretical concepts. However, this does not fully explain why there is a greater effect size for participants who use metacognition to explicitly model metacognitive and cognitive strategies in their classroom teaching, compared to when teaching online.

Is there a difference in the type, or frequency, of explicit modelling of metacognitive and cognitive strategies between teaching in the classroom and teaching via online platforms?

Participants' self-rated responses to the survey suggest there was a difference in the frequency of the explicit modelling of metacognitive and cognitive strategies between when teachers taught in classrooms and when they taught via online platforms, such as Microsoft Teams or Zoom, as shown in Table 4.5. As well as demonstrating that each of the five strategies were taught more often in the classroom than alone, survey data also revealed which strategies were taught most often in both scenarios. For example, teaching model answers was the most frequently modelled strategy in both scenarios, with 193 (68%) of teachers using this in the classroom, compared to 149 (55%) using it online. This shows that although there was a decrease in its use when teaching online, it was still the most popular strategy overall. This pattern was repeated through all five strategies used "frequently", insofar as the second to fifth most popularly modelled strategies were the same in both scenarios. For example, the modelling of memorisation strategies, was placed fifth (as it was used the least) in both classroom (*n*=121, 43%) and online (*n*=70, 26%) teaching. The order was, starting with the most popular, the explicit modelling of: teaching model answers; teaching planning strategies; teaching self-assessment strategies; teaching time-management strategies, and teaching memorisation strategies. The order of how many times these strategies were used changed depending on how often they used them. For example, time-time management strategies were the ones taught most often in the "sometimes" category in the classroom, whereas teaching planning strategies was the most popular for on-line teaching in this category.

Participants' free responses to the question, "What (if any) impact does the difference in face-to-face teaching in the classroom and online face-to-face teaching have on your ability to be able teach effectively?" did offer some insight into why some teachers might explicitly model metacognitive and cognitive strategies to students more frequently when teaching in the

classroom, compared to online. One of the challenges that faced teachers during the Covid-19 pandemic was lack of digital literacy and competence with online teaching platforms within the profession (H. Liu et al., 2022; Sánchez-Cruzado et al., 2021). This was compounded by the rapid closure of schools to most students in the United Kingdom with little notice or time to develop technological skills in March 2020 and this could have presented a potential barrier to some teachers' ability to be able to live model metacognitive and cognitive strategies online. For example, one participant responded that it was lack of access to technology that made online live modelling challenging, "Harder to demonstrate things such as highlighting as I don't have a visualiser or software.", while another commented, "Without a large whiteboard and the chance to talk through ideas while illustrating them physically on the board, I know the messages I am trying to send are not getting through to students." However, these were the only references to technology or classroom equipment. This may be because the survey was opened after teachers had been teaching online for at least 9 months following the closure of schools during the Covid-19 pandemic and teachers had become more adept at using online teaching platforms and digital technology. As another participant responded, "I am working on my ability to use technology better – such as use of digital inking to live model."

Two participants stated that they found online modelling easier in the online classroom lessons. One did not give a reason, while another related it to student behaviour, "Modelling is much easier online as it is often difficult to manage behaviour in the classroom as I have my back to students." A third teacher observed that they modelled more answers online because online learning pejoratively impacted on their ability to assess student understanding, "More modelling of answers rather than them exploring the concept as I cannot gauge their understanding."

A further four participants referenced modelling in their responses and these all commented that explicit or live modelling was either simpler or more effective in a classroom

environment. For example, “Modelling is easier in the classroom. Being able to see non-verbal cues from pupils!” and “Modelling, scaffolding and timing reminders are much more directly impactful in a classroom setting. You can’t give live feedback in the same way.” The same participant also referenced feedback, but that it was the difficulty in obtaining student feedback that made modelling harder to do online, “students are very much “on their own at home, so if they are quiet / less responsive you can’t react to that, whereas in a classroom someone who doesn’t look engaged /looks engaged but unsure is someone you can target for quick feedback / additional modelling / other teaching strategies to support their next steps.” Although this discussion is focussed on Study 2, it will be expanded in further detail in the general discussion in Chapter 6.

5.9 Limitations

The findings in this study are subject to some limitations, in areas such as participant recruitment; diversity within the sample; self-reported data, and the differences between the various methods of metacognitive training, which could be addressed in future research. One of the main limitations of the study was the difficulty in recruiting sufficient qualifying participants. The closing down of schools due to the Covid-19 pandemic and the additional pressures this placed on teachers, along with shift to online learning platforms, during the data collection may have impacted negatively both on recruitment and teachers’ ability to reflect on their pedagogy within the classroom. The initial recruitment window was planned as 4 to 8 weeks; however, during this time only 40 participants were recruited; consequently, the time the survey remained open was extended to 18 weeks, resulting in 305 more eligible responses. Responses from emails to head teachers asking them to promote the survey to their teaching staff also suggested that increased teacher workload, as a result of the pandemic (Walker et al., 2020), may have been a factor in recruitment. Out of 287 schools contacted directly via

email, 273 did not respond, while 11 directly referenced increased teacher workload and stress, due to the pandemic, as the reason for not passing the survey link onto their teaching staff, as it could potentially add to teacher workload. The recruitment method of snowball sampling from initial contacts and social media posts may also have resulted in some sample bias as it is possible that teachers with a prior awareness, or understanding, of metacognition were more likely to be interested in completing the survey than those with no interest. Although social media posts stated that "no understanding of metacognition" was required for qualifying teachers to complete the survey, *n*=157 participants self-rated as having an expert or good understanding of metacognition compared to a total of *n*=47 who considered themselves to have none or a limited understanding of the term.

Furthermore, these recruitment methods did not provide enough scope for balanced statistical analysis to test the hypothesis that participants' metacognitive understanding was not based on the geographic location they taught in, as 95% of participating teachers worked in English schools (*n*=329). Although the majority of participants *n*=267 (77%) identified as female, this was broadly representative of the 75.8% percentage of women working in the English teacher workforce according to the latest statistics reported from the School Workforce Census (UK Government, 2020). However, a more effective approach to reflect the general teaching population within the UK and increase the sample size, would be to recruit a variety of primary, secondary and Further Education schools across the UK to participate in the research. This purposive sampling would allow all qualifying teachers within the schools the same opportunity to complete the questionnaire, irrespective of prior awareness or understanding of metacognition, and provide enough scope for statistical analysis of metacognitive understanding based upon different demographics.

Another limitation of the study was its reliance on self-reported data, although objective understanding of metacognition was collected via the coded free-responses asking participants

what they understood the term metacognition to mean. One of the weakness of this method of data collection was that it did not allow for clarification if any of the participants did not understand a question, particularly if they had no prior knowledge of metacognition, which may explain why not all participants completed the survey. The task asking for free–response metacognition explanations gave teachers no further guidance and it may be that if they had been asked to give as detailed explanation as they were able to they may have given a response that indicated a higher level of understanding. This could partially reflect why most participants overestimated their understanding of metacognition as good or excellent in comparison to their explanations, which showed a reasonable understanding. Furthermore, it is possible that participants may not have been able to assess their understanding of metacognition and self-efficacy precisely, or accurately rate how often they used different strategies when teaching. It is also possible that their self-reported answers were not honest (Rosenman et al., 2011) with teachers giving responses that over-estimated their metacognitive understanding, or use of strategies, to give responses that reflected them in a more flattering light. This could explain the large effect sizes for the self-reported use of strategies and also why higher levels of self-reported understanding of metacognition were not reflected in explanations of metacognition. However, the closure of schools and restrictions on social distancing and interaction, as a result of the Covid-19 pandemic, also limited the access of face-to-face interviews during the data collection. Moreover, face-to-face interviews would have greatly reduced the scale of data that could be collected. Instead, the self-reported element of the questionnaire meant the process of gathering responses from participants recruited from the social media was relatively simple and allowed for a larger sample to be gathered. As well as ensuing ethical requirements were met, the anonymity of participants may have gone some way towards mitigating any potential inclination of respondents to give responses that overestimated their understanding of metacognition, as they received no recognition for doing so.

Although the results suggest that participants who had taken part in higher numbers of different types of training in metacognition demonstrated an increased understanding of the term "metacognition", the study did not measure if any one method of training was more effective, or the participants' attitudes to the effectiveness of the different types of CPD within this area. However, given that there are now many schools, research schools and external training providers offering CPD in metacognition, in addition to teachers' own personal study and research in this area, it would be problematic to accurately measure the impact of one single method of training in this area. A promising area for further study would be to explore the potential impact of developing a programme of metacognition training specifically targeted at developing understanding and pedagogical expertise in this field. Although findings from this study show that participants self-rated metacognitive understanding did increase, based on the number of different types of Continuous Professional Development teachers had experienced, it did not measure the impact of the individual training methods or how much training is required to ensure metacognitive practices are embedded. Currently, no research exists evaluating the impact of specific programmes of metacognitive training on educators' understanding and use of metacognitive practices in their practice, or on the effectiveness of different types of training in this field.

Chapter 6

6.1 General discussion

Study 1 and 2 were conducted as discrete studies; however, there were some overarching findings and themes related to teacher understanding of metacognition that linked to both studies. These themes related to: teacher and student understanding of metacognition; metacognitive classroom talk; a shared lexical framework for understanding of the term metacognition, and teacher Continuous Professional Development in metacognition.

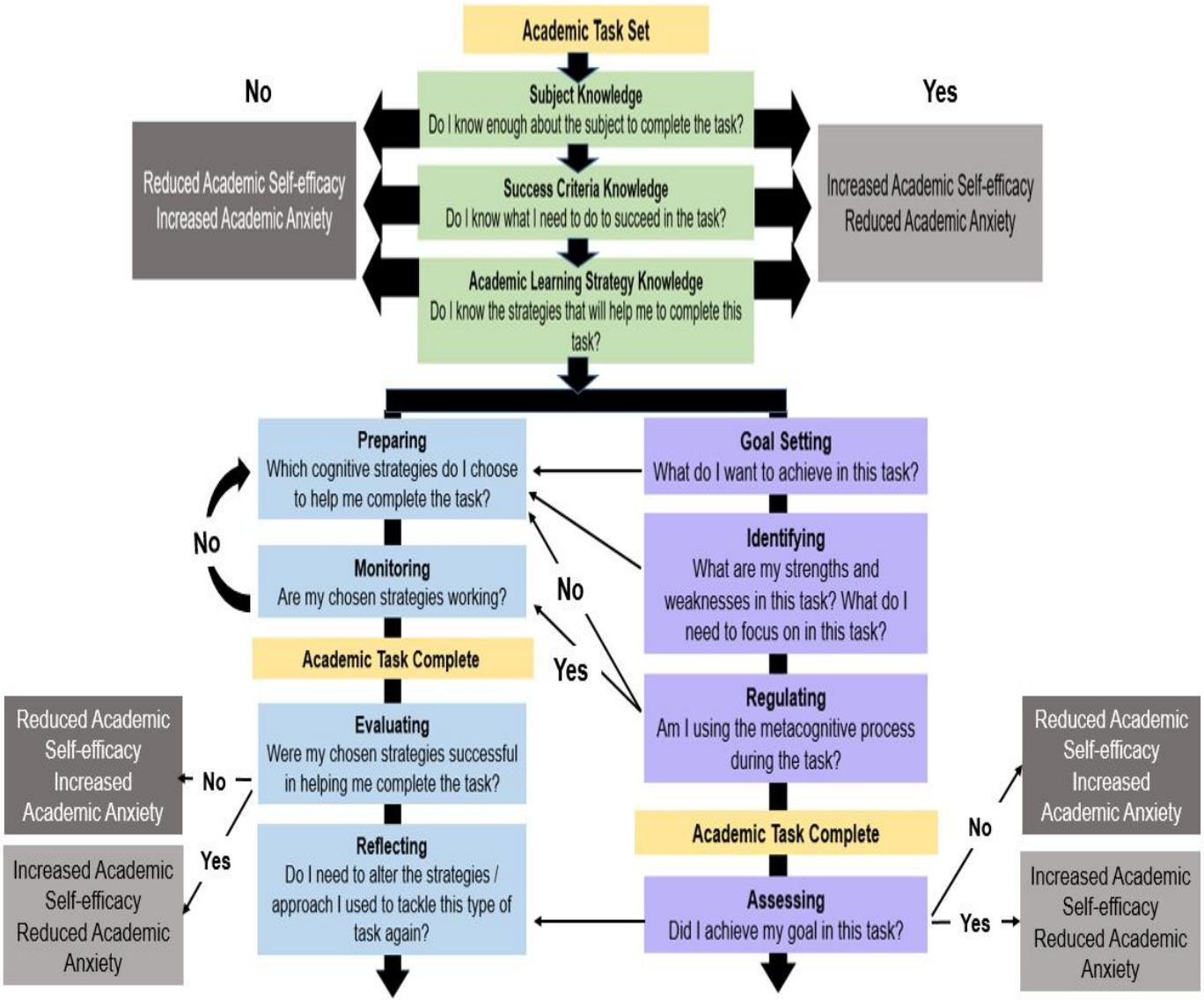
Research into the field of metacognition supports the theory that teacher understanding of metacognition can impact on student understanding of metacognition (Branigan & Donaldson, 2020; Muijs & Bokhove, 2020; Ozturk, 2017, 2018; Perry et al., 2018; Wall & Hall, 2016; Wilson & Bai, 2010). It therefore seems logical that teachers with higher levels of understanding about metacognition will be better placed to help students develop a metacognitive approach to their learning. This could be beneficial, as studies into metacognition suggest that adopting a metacognitive approach to learning can have a positive impact on student attainment (Braund & DeLuca, 2018; Desoete & De Craene, 2019; Perry et al., 2018). Therefore, there may be merit in teachers learning about metacognition so that they are able to not only develop their own understanding of, and practice in, this field, but also to develop students' metacognitive understanding. Results from Study 2 demonstrated that participants with a higher understanding of metacognition were more likely to use metacognition in their teaching practice and to use explicit teacher modelling when teaching in the classroom (and using online platforms). Research indicates that teachers need extensive guidance and assistance to effectively understand and implement new approaches in the classroom (Enser & Enser, 2021; Muijs & Bokhove, 2020; Muijs et al., 2014; Sharples et al., 2018) and that insufficient training may result in interventions not being effectively implemented, or lethal mutations in the classroom, where theory becomes uncoupled from

practice (Perry et al., 2021; Sharples et al., 2018). Results from Study 1 indicated that although students in the experimental group showed a small increase in use of metacognition in their learning, it was not statistically significant. It is possible that lack of a statistically significant result was a consequence of teachers delivering the metacognitive approach not being given sufficient training, as part of the study, to develop their own understanding of metacognition, or how to develop it in the classroom. Research conducted by Ozturk (2018), into teachers' competencies in teaching metacognition, theorised that the limited teacher training given in to teachers in the study meant that teachers did not develop a understanding of metacognition, which could be used to foster a metacognitive approach in the classroom. However, as previously stated, students in the experimental group in Study 1 were still exposed to instructional videos and materials developed by the researcher, and to teachers delivering the metacognitive approach by explicitly modelling their thought processes, which may account for the slight increase in levels of metacognition. Therefore, a potential area for future study may include increasing the amount of training given to teachers delivering the metacognitive approach. This could be done either in an extended, in-depth session, which included more content about the theoretical understanding of the metacognitive process, or through shorter, continuous training threaded through the duration of the unit. It is also possible that teachers delivering lessons with the metacognitive content in Study 1 further increased their understanding of metacognition by engaging with the materials when teaching them. Although it was not a direct outcome measure for Study 1, it would have been an interesting area of investigation to measure if, or how much, the teachers training and/ or delivering of the lesson materials had impacted on participating teachers' understanding of metacognition and use of it in their own practice by completing the survey used in Study 2 both pre- and post-intervention.

Metacognitive talk can also play an important role in fostering metacognition in the classroom (Quigley et al., 2018; Wall & Hall, 2016); the promotion of metacognitive talk in

the classroom was one of the seven recommendations made in the EEF's guidance report on metacognition (2018). Furthermore, Wall and Hall's Stages of Metacognitive Engagement model (2016) posited that a shared metacognitive vocabulary between teachers and students was vital in fostering a metacognitive approach in students. Results from Study 2 suggest the emergence of a lexical framework to describe metacognition; however, the lexical frequencies data (Table 5.4) indicated that although the most frequently used terms (thinking and learning) can be perceived as relating to metacognition they do not reflect a specific understanding of the term. This is not surprising given that there is still no universally agreed definition of the term and the conceptual understanding of metacognition remains "fuzzy" (Akturk & Sahin, 2011; Dinsmore et al., 2008; Muijs & Bokhove, 2020). This ambiguity is also reflected in the prevalence of the phrase "thinking about thinking" in teacher explanations of the term in Study 2 – a phrase that is ostensibly as nebulous and open to interpretation as the term metacognition appears to be. Given the lack of consensus surrounding the concept, creating a universally agreed understanding of the term seems unlikely at present. However, it may help teachers to think of metacognition as a 4-part process, as suggested as part of the Metacognitive Task Completion Model created by the researcher for this thesis (Figure 6.1). Therefore, even if an exact agreement of the term cannot be reached at present, there are certain elements and definition of those elements that could be agreed, such as: prepare, monitor, evaluate and reflect.

Figure 6.1 *Metacognitive Task Completion Process (MTCP) Model*



Understanding these elements could help teachers increase their metacognitive understanding and talk in the classroom by applying them to the metacognitive strategies, such as teacher modelling, which students in the acceptability study found beneficial in helping them improve their academic attainment scores and better understanding how to approach and tackle an academic assessment on *Macbeth*. Although students in the experimental group in Study 1 were exposed to metacognitive talk through the videos and teacher modelling, it is possible that if teachers delivering these lessons had had further training in the metacognitive process

and how to promote metacognitive talk in the classroom, this would have increased participants' exposure to metacognitive talk. Including training on metacognitive talk as part of the CPD for teachers delivering the intervention in Study 1 would be a promising area for future study as it could potentially increase teachers' understanding of metacognition and help them support students in developing a metacognitive process in their learning.

Results from Study 2 showed that the number of Continuous Professional Development sessions that teachers had participated in increased both their understanding of metacognition and use of it in their own practice. Guidance by the EEF (2018) suggested that the metacognitive process can be applied in different curriculum areas and it does appear that the different phases in the metacognitive process (as shown in the proposed MTCP model in Figure 6.1) such as preparing, monitoring, evaluation and monitoring could be applied to different educational stages and subjects. This is reflected in the results from Study 2, which demonstrated that participants' understanding of metacognition did not differ depending on the age range of students they taught, or their subject specialism. Furthermore, results from Study 2 also showed that metacognition did not differ depending on participants' length of service, which indicates that metacognitive understanding may not develop naturally through teaching experience. There could, therefore, be some merit in introducing training in metacognition as a compulsory unit in Initial Teacher Training courses in both primary and secondary education. Given that it appears that in-depth training may be required to implement a theoretical concept effectively in the classroom (Sharples et al., 2018) this training would benefit from being a unit (perhaps coupled with cognitive science principles) or required assessment task, rather than a single lecture, optional module or one choice in a range of assessment tasks. Teachers engagement in metacognitive theory could be further developed by introducing a strand on metacognition and cognitive science principles into the National Teachers' Standards.

Although the metacognitive process is not subject specific in itself, subject-specific domain knowledge is required for it to be effective in helping learners tackle academic tasks (as proposed in the MTCP model, shown in Figure 6.1). Although not measuring if the type of metacognition CPD training sessions that teachers in Study 2 undertook was a limitation of the study; the results suggested that the amount of CPD that teachers participated in appeared to benefit them and that the more opportunities they have to undertake this, the higher their understanding of metacognition. Consequently, bespoke subject-specific training could also be of benefit to help teachers apply their theoretical understanding of metacognition to their curriculum area and classroom practice. A promising area for further study would be investigating which types of metacognition CPD are most effective in increasing teachers' understanding of metacognition and if there is an optimal duration of training required for this training to be fully understood so that it can be implemented efficiently in the classroom.

6.2 Strengths and limitations of both studies

Although both studies were run separately to each other, including them both within the parameters of this thesis added to my understanding of metacognition and self-efficacy theory. In addition to increasing my generic theoretical knowledge of both concepts, investigating the literature also gave me the opportunity to research how they related to both teachers and students. The results from Study 2 challenged my assumption that teachers' understanding of metacognition increased with teaching experience. This knowledge was particularly useful when reflecting on the impact of the metacognitive approach on students' use of metacognition in the experimental group between Time 1 and Time 3. As results demonstrated that students in the experimental only slightly increased their use of metacognition and this increase was not statistically significant (compared to their peers in the control group), Study 2 was beneficial in informing possible reasons why the increase in metacognition was not as high as I expected.

This was because it highlighted the impact that teacher CPD in metacognition could have on teachers understanding of metacognition. Investigating the potential impact of metacognition CPD on participants' understanding of metacognition in Study 2, helped me appreciate that the CPD given to teachers in Study 1 delivering the metacognitive approach to students in the experimental group was unlikely to have been sufficient to embed teacher understanding of metacognition. This enabled me to identify lack of teacher training as a probable weakness in the design of Study 1 and develop my own understanding of how important extensive and comprehensive teacher training is in ensuring the effective implementation of interventions in the classroom environment.

Although Study 1 took significantly longer to design and resource, as I planned and created all lesson materials and resources, my experience as teacher helped expedite this process so that the time taken did not compromise the design or running of Study 2. Furthermore, when Study 1 was terminated (due to the closure of schools in the Covid-19 pandemic) having an additional study I could run, which was not reliant on being delivered in a face-to-face scenario, meant that the data for Study 2 could be still collected and run (albeit with a slightly delayed start date) when schools closed again in January 2021 and further delayed the start of Study 1. Overall, the running of the two studies did not appear to create any significant weaknesses in this approach.

6.3 Reflection

As a teacher, the theoretical understanding I gained from my research into metacognition and metacognitive and cognitive strategies completely transformed the way I taught. For example, previous to my research for Study 1, I had only dabbled in live modelling and generally preferred to share exemplar materials with students, which we used as models of good practice, or redrafted to create improved responses, as this was the method I had been taught to use in

my teacher training. My initial research into the benefits of live modelling helped me to understand that, as an expert learner, I had a wealth of tacit knowledge that I assumed my students had too. Although student responses to the acceptability study demonstrated that students found this approach beneficial, I was also able to observe the confidence of my class develop and the improvement in the way they articulated themselves in their written responses (even though these were not part of the measures for the acceptability study). I also observed that it developed participants' independence as they were more capable of starting a task (after a similar task had been modelled to them) without asking for support. Even though I no longer work as a teacher, I changed my practice to live model as much as I could in the classroom and now share my understanding of the benefits of modelling with the schools I work with and through blogs and webinars on modelling.

In addition to the disciplinary knowledge I have learned through my research as part of both studies, my increased understanding of metacognition has also helped me foster a metacognitive approach to my research and made me cognitive of the different strategies I can use to help me succeed. Because of this, I am now more aware of my own thought processes as a learner, and of my strengths and weaknesses. Thus, I can prepare more effectively for completing a task and am more adaptive in my approach, particularly when I hit a barrier in my learning. My dual-role as both practicing teacher and researcher helped me bridge the gap between theory and practice as it helped me be more adaptive in running Study 1 in a messy, authentic school environment. This was particularly useful when adapting the study to accommodate changes in teacher timetabling, such as creating the additional discrete knowledge-only lessons necessitated by changes in staffing due to students being taught in "bubbles" to enable greater social distancing during Covid-19 restrictions. As previously noted, if I was to run Study 1 again, I would include more in depth and sustained teacher training to support teachers delivering the combined metacognitive-approach lessons to students. I would

also make metacognitive teacher talk an integral part of the lessons so that students (and teachers) were more familiar with the different stages of the metacognitive process and how to apply them to their learning.

6.4 Future Research

In additional to the areas of future research indicated in the general discussion (Section 6.1), research from Study 1 could be built on by running a longitudinal study to investigate if the experimental groups' increase in academic attainment and memory for quotations in *Macbeth* was sustained over time and affected student scores in the *Macbeth* (Shakespeare) component of terminal GCSE English literature examinations. This could be developed by creating a Key Stage 4 curriculum plan that embedded the metacognitive approach and metacognitive and cognitive strategies (used in Study 1) throughout the unit so that they could be applied and interleaved through different GCSE texts to investigate if this had an impact on attainment in terminal GCSE English literature examinations. There may also be benefit in running a study to research the impact of teacher modelling on academic attainment by isolating it from the other strategies used in Study 1 further investigate the contribution it has (if any) on student attainment, metacognition and self-efficacy in authentic classroom settings.

The data from Study 2 could be further analysed to investigate if there is a correlation between teachers self-reported understanding of metacognition and their objective understanding of metacognition. As free-responses were also collected from participants in answer to the question, "How well do you understand the term self-efficacy in relation to teaching?" there would be merit in analysing this data to see if a lexical framework to describe self-efficacy emerges. A categorisation matrix could also be created for self-efficacy so it was possible to analyse if there was a correlation between teachers' self-reported understanding of self-efficacy and their objective understanding of the term. A thematic analysis of participants'

free-responses from the question, “What (if any) impact does the difference in face-to-face teaching in the classroom compared to online face-to-face to face teaching have on your ability to be able to teach effectively?” could also be conducted to explore what differences between these two scenarios may impact more generally on teachers’ efficacy.

Although Study 2 collected useful data about understanding and use of metacognition, a qualitative study where teachers who had participated in metacognition CPD were interviewed pre- and post-training about their understanding and use of metacognition may be a useful area of research in helping identify what the key components of teacher training in metacognition are. As metacognitive concepts are complex and nebulous then the focus should be on fostering teacher understanding of metacognition so that educators can effectively support their students in developing a metacognitive approach to their learning. Without this understanding, both students and teachers will struggle to become metacognitive learners.

Appendices

Appendix A: Acceptability Study

A.1. Context

In order to assess the intervention content, study design and procedures from the perspective of the target participants, an acceptability study was run in the summer term, commencing April 2019. In addition to exploring participating students' overall experiences of being taught a combined knowledge-based and metacognitive approach to *Macbeth*, it also provided an opportunity to evaluate the feasibility of the intervention and to make adjustments based on both of these factors. The acceptability study was conducted with a sample of Year 9 students (*n*=59) from the participating school, with the aim of recruiting participants that were at an equitable academic stage to those that would be following the refined intervention in the next academic year. Acceptability was assessed using a quantitative and qualitative evaluation questionnaire completed by participants at the end of the intervention to explore students' overall experience of this approach.

A.2. Participants

Participating students in the acceptability study were drawn from Year 9 of the school participating in Study 1, described in full in Chapter 3. All participants (*n* = 59) in the acceptability study had been taught by the researcher as part of their normal timetabled English lessons in the school throughout Year 9. As was standard practice within the school, the cohort was divided into two year halves (A and B) and set into four classes on each side, which were predicated on prior attainment. Set 1 contained students with the highest levels of prior attainment and both classes taking part in the acceptability study were taught in Set 1 (one in half A and one in half B). Of the total (*n*= 60) taught by the researcher in Year 9, *n*= 59 students participated in the data collection, the remaining student was on holiday at the time the

questionnaire was distributed and completed by the other participants, although they did receive the intervention.

A.2.1 Ethical approval.

Ethical approval was sought, on an opt-in basis, for participants to complete the evaluation questionnaire and for this data to be analysed and reported as part of the findings of the acceptability study. The aim of the questionnaire was to gather acceptability data on student perceptions of the intervention and any impact they felt it had on their academic attainment, self-efficacy, memory for quotations, or academic anxiety. This was intended to make it possible to make empirical observations about the potential impact of this approach, and consequently create the opportunity to reflect upon and adjust the intervention content, if required. However, ethical approval was not sought for students to participate in the teaching of the study as students were taught by the researcher (as their class teacher) in their normal timetabled lessons and, as part of the English department's long term curriculum plan, all students in the year group were studying the same GCSE text of *Macbeth* during the term. Furthermore, no attainment or personal date was required from students participating in the intervention. Ethical approval was sought from parents for students to complete an evaluation questionnaire in July 2019. This was to gather acceptability data on student perceptions of being taught using the approach that had been developed for Study 1 and any impact they felt it had on their academic attainment, self-efficacy, memory for quotations, or academic anxiety. An information letter was sent out to the parents of all participants, which explained: the purpose of the study; what it meant for their child; how the data would be stored and used, and anonymity and confidentiality procedures. A copy of the consent letter and form sent to parents can be found in Figure A.9 in the appendix. A General Data Protection Regulation (GDPR) information sheet was also sent out to parents to explain the legislation relating to data

collection and usage. Consent was given via opt-in permission form; an opt-in permission was chosen as a more robust method to an opt-out permission form to ensure that all parents had read the letter and consented to their child participating in the acceptability study. Ethical approval was also granted by the University of York Education Department's Ethical Committee.

A.3 Measures

An acceptability questionnaire was devised to measure how students perceived the metacognitive approach to teaching *Macbeth*, as a GCSE English literature text, and to explore whether the approach was likely to meet the needs of English secondary school students studying GCSE English literature in preparation for the new GCSE-style assessments (Grades 1-9). Students did not put their names on the questionnaires, this to ensure all responses were anonymous and that individuals could not be identified. The aim of this was also to encourage participants as much as possible to provide candid feedback by giving them the opportunity to express open views that were not shaped by their view of their teacher. This was a consideration as research suggests that positive interpersonal relationships between students and teachers may have a positive impact on student engagement (Havik & Westergård, 2020; Liu, 2013; Sprinkle, 2008). To further mitigate for this, the questionnaires were given out and administered by two teachers at the participating school (not including the researcher), who were blind to the research aims and research questions. This was to help ensure that students answered independently and without any support or guidance from the researcher, removing possible intentional or unconscious bias, in their responses.

The questionnaire was divided into two sections. The first part (Figure A.1) was designed to garner quantitative data and asked students to self-rate the impact that teacher-led strategies (such as explicitly modelling how to write an assessment) had on their learning

experiences. The second part of the questionnaire required students to self-rate how effective they had found strategies they could use independently, such as using revision cards for self-testing and spaced learning. Both sections asked participants how they felt the different cognitive and metacognitive strategies had helped them in four different areas: improving assessment marks; learning quotations off by heart; increasing confidence for tackling an assessment, and helping to reduce worry about completing assessments. These measures were chosen so that results could be linked directly to the outcomes measured by the research questions in Study 1, which focused on academic attainment, memory for quotations, self-efficacy and academic anxiety. Students self–rated how useful they had found each strategy using a 3-point Likert scale, which ranged from "very" useful to "not at all" useful.

Figure A.1 *Section 1 of the acceptability study questionnaire*

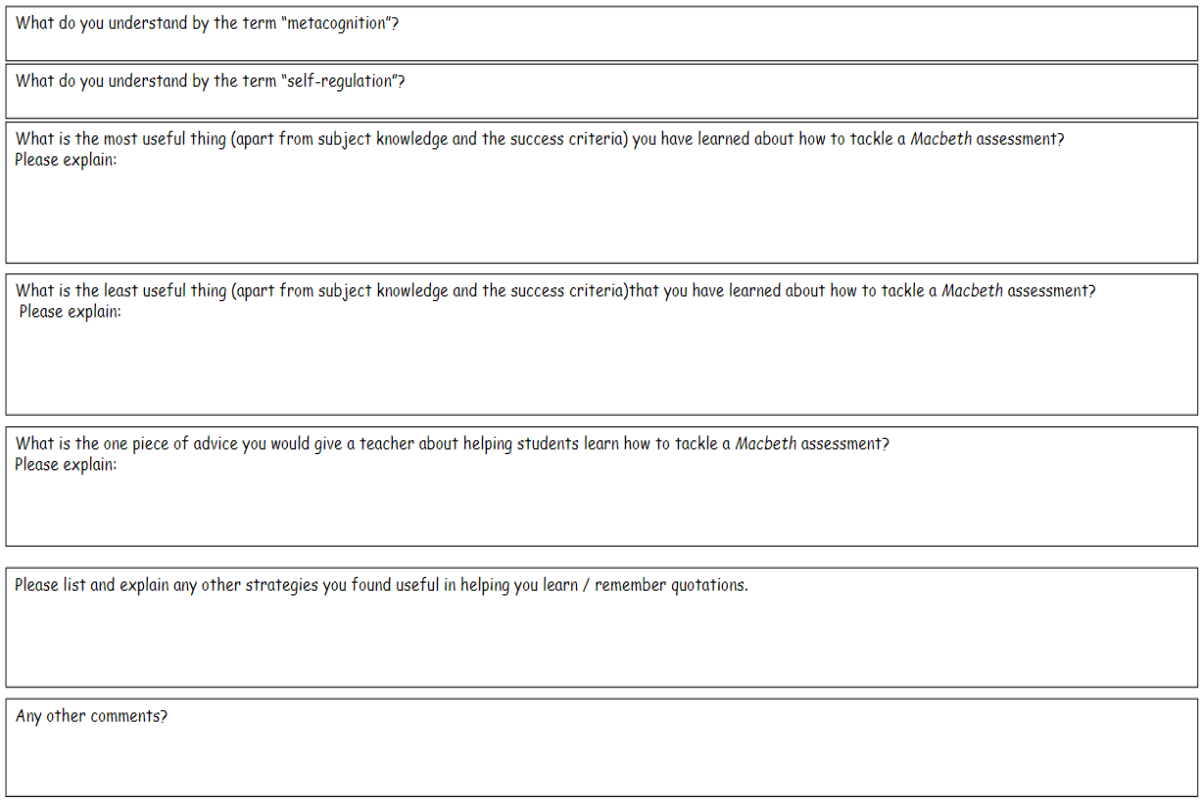
What impact have the following strategies had on your learning? Please tick the relevant box for each strategy.

Strategy (teacher-led)	How useful have you found this in improving your assessment marks?			How useful have you found this in helping you learn quotes?			How useful have you found this in reducing worry about completing English assessments?			How useful have you found this in reducing worry about completing English assessments?		
	Very useful	A bit	Not at all	Very useful	A bit	Not at all	Very useful	A bit	Not at all	Very useful	A bit	Not at all
3 minute recall time in lessons												
Live modelling how they mark student work (on visualizers)												
Planning how to structure an essay on the board (mindmap)												
Modelling how to write essays on the board												
Showing how to work out meanings of unfamiliar words.												
Strategy (can use on my own)	**How useful have you found this in improving your assessment marks?**			**How useful have you found this in helping you learn quotes?**			**How useful have you found this in reducing worry about completing English assessments?**			**How useful have you found this in reducing worry about completing English assessments?**		
	Very useful	A bit	Not at all	Very useful	A bit	Not at all	Very useful	A bit	Not at all	Very useful	A bit	Not at all
Revision cards for self-testing.												
Highlighting /skim reading a text to pick out key quotes												
Checking after every paragraph that I'm on task.												
Spaced-learning.												
Creating my own revision plans for essays.												

The second, qualitative part of the questionnaire (Figure A.2 in the appendix) asked open-ended questions to participants about their overall experiences of the lessons. The purpose of this was to find out if participants considered the lessons and lesson materials to be appropriate and to ascertain if any parts of the study needed to be amended before being implemented for Study 1. Firstly, students were asked what they understood by the words metacognition and self-regulation. Although student understanding of metacognition was not being measured in the acceptability trial, one of the purposes of Study 1 was to investigate if the intervention increased student use of metacognition. Thus, the inclusion of these questions in the acceptability questionnaire, was designed to explore what participants' understanding of these terms was like at the end of the intervention and to ascertain if the intervention needed to be changed to make the teaching of these terms more explicit. To find out which parts of the intervention participants found most and least beneficial, they were asked to state the most useful and least useful things they had learned about how to tackle a *Macbeth* assessment and to explain their responses. To help students focus on the cognitive and metacognitive strategies and metacognitive processes they had learned (rather than on declarative knowledge) the questionnaire stated that they should not comment on their new subject knowledge or understanding of the success criteria. To further explore their perceptions of the intervention in helping them tackle an assessment, they were asked what advice they would give to a teacher to help them teach students how to tackle a *Macbeth* assessment. This was deliberately phrased so that students could offer advice on any element of the intervention and include both positive and negative comments about the intervention. As one of the measures for Study 1 centred on learning quotations off by heart, the questionnaire included a question asking students which strategies they had found the most useful in helping them memorise quotations, so these could be included in the final intervention. Finally, participants were given the opportunity to write down any other comments they had. This open-ended question was designed to give students

an opportunity to include any other observations or perceptions they may have had about the intervention.

Figure A.2 *Section 2 of the acceptability study questionnaire*


What do you understand by the term "metacognition"?

What do you understand by the term "self-regulation"?

What is the most useful thing (apart from subject knowledge and the success criteria) you have learned about how to tackle a *Macbeth* assessment?
Please explain:

What is the least useful thing (apart from subject knowledge and the success criteria)that you have learned about how to tackle a *Macbeth* assessment?
Please explain:

What is the one piece of advice you would give a teacher about helping students learn how to tackle a *Macbeth* assessment?
Please explain:

Please list and explain any other strategies you found useful in helping you learn / remember quotations.

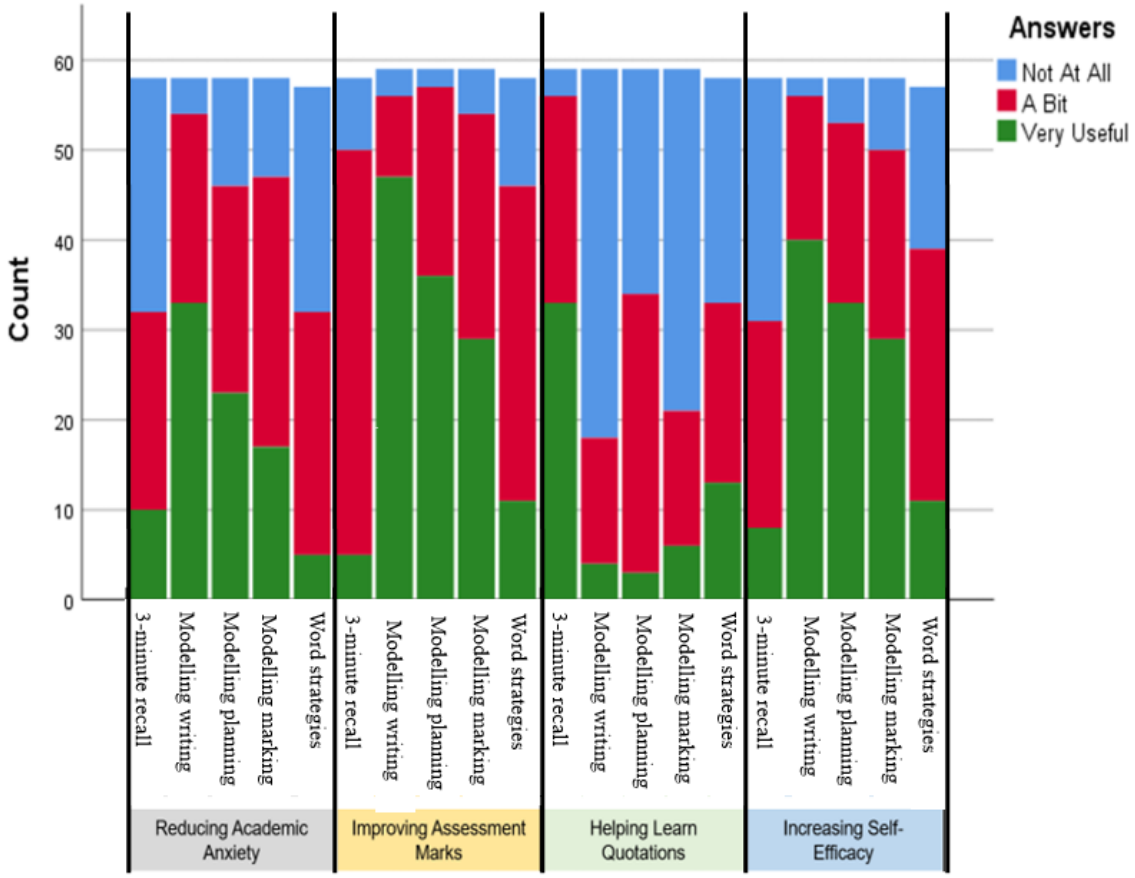
Any other comments?

A.4 Results and Discussion

Students each self-reported how useful they found each of the five teacher-led strategies in each of the four following outcome measures for Study 1: reducing academic anxiety; improving assessment marks; helping memorise quotations, and increasing self-efficacy. The five strategies were: the inclusion of a 3-minute recall session within each lesson; the teacher live-modelling how to complete a task; the teacher live modelling how to plan as essay; the teacher live modelling the marking of students' work and how to tackle working out the meanings of unfamiliar words. The results (as shown in Figure A.3) demonstrate that overall, students perceived the strategies as most useful in helping them approve their assessment

marks. As expected, some strategies were considered to be more useful for some outcomes than others as they were targeted to help students tackle specific tasks. For example, the 3-minute recall was reported as the most useful in helping students memorise quotations, whereas the teacher live modelling their marking appeared the most useful in helping students improve their assessment marks.

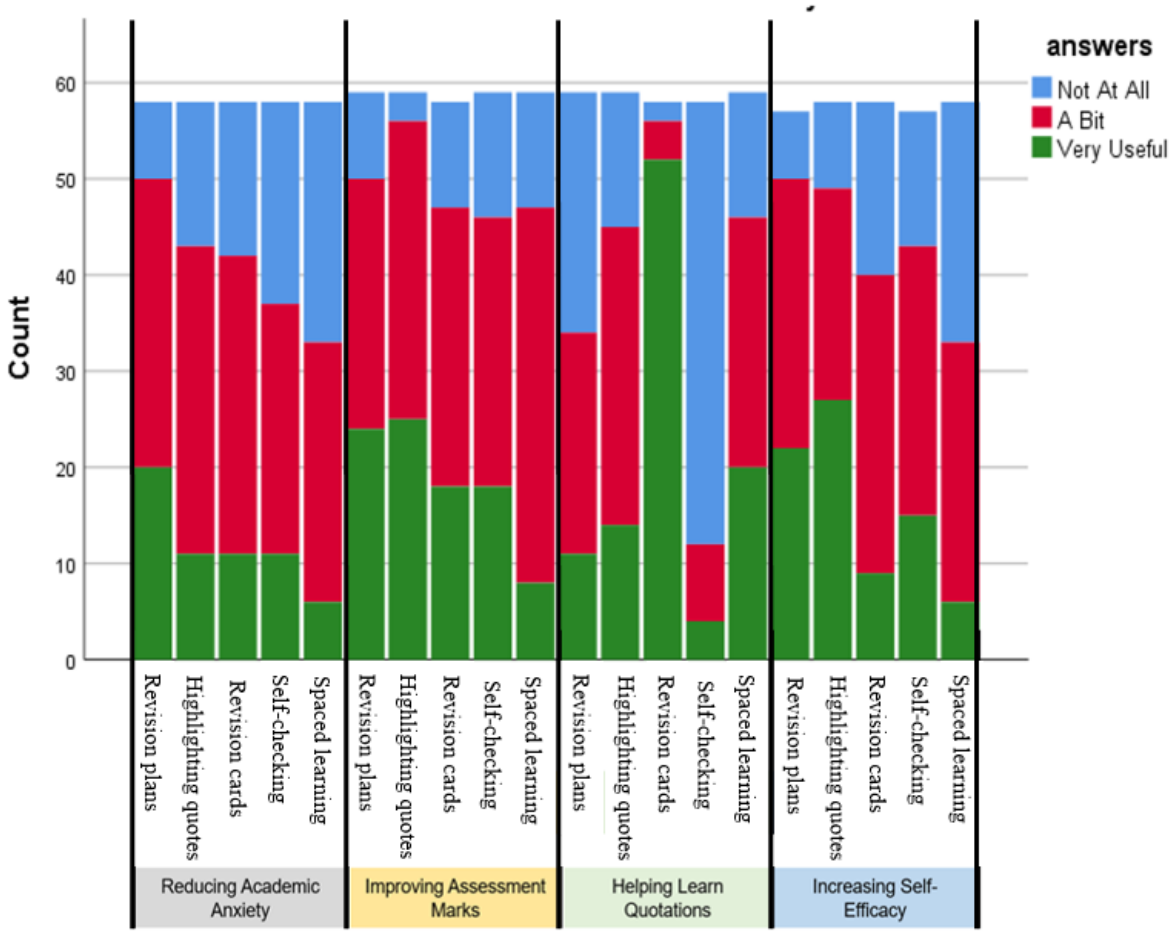
Figure A.3 *The effect of teacher-led strategies*



Students also self-reported how useful they found each of the five strategies they used independently (after they had been modelled and taught to them by the teacher) in the same areas of: reducing academic anxiety; improving assessment marks; helping memorise quotations, and increasing self-efficacy. The five independent strategies were: creating and using revision plans; highlighting key quotations in assessment extracts (so they could identify and organise the evidence used to support their ideas); creating and using dual-coded revision

cards; using spaced learning, and pausing at the end of each paragraph as they wrote to monitor their progress and adapt their approach, if required.

Figure A.4 *The self-reported effect of student-led independent strategies*



Overall, participants also self-reported these strategies as being most helpful in increasing academic attainment. Furthermore, as anticipated, specific strategies were also perceived by students as being more beneficial in helping them improve in a particular area. For example, the use of dual-coded revision cards and spaced learning were ranked as the most helpful in helping students independently memorise quotations. In comparison, the use of a self-checking written paragraphs scored as the least useful in this area, which was expected as this strategy was not designed by the researcher to be used for retrieval practice.

Does the intervention lead to an increase in student's self-rated perceptions of how much the strategies have helped them improve their assessment marks?

Quantitative results from the acceptability study sample indicated that students viewed the teacher-led strategies as having the most impact on improving their assessment marks. Of these strategies, explicit modelling by the teacher of how to plan, write and mark GCSE-style essays was the one that appeared to be the most helpful to students. Students perceived the process of the teacher sharing their expertise by verbalising their thought processes as they constructed a successful GCSE exam response to an examination question (using the visualizer, or white board) to be most helpful in helping them increase their assessment grades with 47 out of 59 (79.6%) students self-reporting it as "very useful". This was compared to only 2 (3.4 %) students who considered this method "not at all" useful. Qualitative responses from students also appeared to show that students valued teacher-modelling as an effective approach in helping them understand how to tackle a *Macbeth* assessment. In response to the question, "What is the most useful thing (apart from subject knowledge and the success criteria) you have learned about how to tackle a *Macbeth* assessment?" teacher modelling of essay writing, or being shown how to structure essays were mentioned 22 times. This included comments such as, "The most useful thing is looking at one the teacher has made as they are usually very detailed and the teacher explains thoroughly what she has wrote [sic] and why." Furthermore, a number of answers to this question also referenced specific strategies that students had been taught to help improve their academic marks during the live-modelling process. For example, students made explicit reference to finding the following information (which had been demonstrated in the live modelling process) useful: tracking methodically through extracts; analysing quotations; making links to other parts of the play; exploring multiple meanings of language, and time management. Student comments included: "I learnt what kind of quotations to include and how to analyse and link them to the play. Learning specific

vocabulary has helped me structure sentences with more sophisticated language."; "I have also learnt to annotate a quote very well and get the most meaning out of it also to track chronologically through the play and the quotations." and "How to annotate and pick out importance in certain pieces of text to secure a good answer."

Participants in the acceptability study also reported that the utilisation of student-led cognitive and metacognitive strategies also had more impact in helping them increase their academic scores than in the other three categories. Of these, applying the skill of skim-reading the text to identify and then highlight key quotations to use in their essay responses was reported as the most useful with only 3 (5%) of participants recording it as "not at all" useful. In contrast 25 (42.4%) answered that they found it "very useful", and 31 (52.6%) "a bit useful". This strategy was included in the intervention to help students answer GCSE-style extract questions. For example, the *Macbeth* extract question in the 2019 GCSE English Literature Shakespeare examination was, "Read the extract [taken from Act 5, Scene 1]. Then answer the following question: Look at how Macbeth speaks and behaves here. How do you think an audience might respond to Macbeth at this point in the play? Refer closely to details from the extract to support your answer." It may be that students found the independent strategy the most useful in improving assessment marks as it could also be employed to improve time-management skills. In quickly identifying key quotations and then highlighting them in the text, students can direct more of their time to writing an answer that tracks logically through the whole text responding closely to those parts of the extract that will enable them to answer the question. Previously, participants had struggled to track through the whole extract in timed conditions, spending too long reading the extract. This meant they did not have enough time to write about the end of the extract and lost marks as a result. Although this strategy was directed at *Macbeth* extracts during the intervention, it is one of a number of the cognitive strategies, used in Study 1, which could be potentially be scaled out to help students efficiently identify

and extract key information in other curriculum areas and with different text types. In response to the question, "What is the least useful thing (apart from subject knowledge and the success criteria) that you have learned about how to tackle a Macbeth assessment?" 31 students left this section blank (compared to the three students who did not complete the question asking what they found most useful) and a further four wrote that everything they found "everything" useful. Of the remaining 24 students no single factor stood out predominantly as being least effective. Responses to this question included: working out the meanings of unfamiliar words (4 students); watching a modern adaptation of the play (2 students); checking they are on track after each paragraph (2 students) and giving examples of marked work (2 students). Five students wrote that annotating the text by themselves did not help with understanding. Although this may be because students struggled to understand the text independently, one of these five students explained that it was because, "it only gives one view", suggesting they found discussing other interpretations of the text beneficial. The same student found looking at "multiple meanings" the most useful strategy they had learned, and their one piece of advice they would give a teacher helping students how to tackle a *Macbeth* assessment was, "Help them with other meanings." The exploration of multiple meanings and ambiguities in the text is required for students to meet the criteria of Band 4 and above for the extract question in Eduqas' GCSE Shakespeare Component. This suggests that this student knew what they needed to do to improve their assessment marks and was familiar with the success criteria.

Does the intervention lead to an increase in student's self-rated perceptions of how much the strategies have helped them develop their self-efficacy?

The data from the sample indicated that participants believed that the teacher-led activities, where the teacher had explicitly modelled essay writing, essay marking and essay planning, had helped increase their perceived self-efficacy. The explicit modelling of how to write an

essay appeared most beneficial in this category with 40 (69%) of students recording is as "very useful" compared to three (5.2%) who found it "not at all useful." The 3-minute recall was considered the least effective strategy for helping increase self-efficacy; only 8 (13.8%) rated it as "very useful", compared to 27 (46.6 %) students that considered it "not at all useful." Of the independent, student-led strategies identifying key quotations appeared to have the biggest impact; 27 (46.6%) considered it "very useful and only 9 (15.5%) "not at all useful." Students also self-reported that being able to create their own detailed revision plans had improved their self-efficacy; 22 (38.6%) of students considered this strategy "very useful" in developing their confidence in their ability to complete a task, in contrast to 7 (12.3%) participants who deemed it "not at all useful." Three students' responses to the question, "What is the most useful thing (apart from subject knowledge and the success criteria) you have learned about how to tackle a Macbeth assessment?" included references to increased "confidence." One of these students wrote, "I found learning how to structure the assessment by watching you or reading others who have got a high grade have boosted my confidence in how to structure a Macbeth assessment or any assessment. This helps me by making me more confident and understand what it should look like." Considering that students reported that teacher-led explicitly modelled essay planning was one of the most effective strategies in helping to boost self-efficacy, it may be they had then transferred the skills learned in this strategy to their own independent essay planning skills, and that they were moving from novice to expert in utilizing this strategy.

Does the intervention lead to an increase in student's self-rated perceptions of how much the strategies have reduced their academic anxiety?

Once again, teacher-led modelled essay writing was rated by participants as the most effective strategy. In this category, it was considered by 33 (57%) of students as "very useful" in helping

reduced academic anxiety. In contrast, only 4 students (6.9%) believed it to be "not at all useful". The explicit modelled planning and marking of essays were also self-reported as helping students reduce their academic anxiety, with the strategy of demonstrating to students how to work out the meanings of unfamiliar words the least effective in this category. From the range of independent strategies used by students, creating detailed essay plans seemed to be most helpful in assisting them with decreasing their academic anxiety as 20 (34.5%) of students recorded it as "very useful", whereas 8 (13.8%) found this strategy "not at all useful" in this category. No students commented on the questionnaire about how the strategies had helped reduce their academic anxiety. This may be because there was no specific reference to this measure in the questions asking for student comments and may be a potential limitation for this study, whereas specific reference was made to memorising quotations.

Does the intervention lead to an increase in students' self-rated perceptions of how much the strategies have helped them improve their ability to learn quotations?

Results from the sample demonstrated that the independent strategy of creating and using dual-coded revision cards was overwhelmingly the most useful to students in helping them to memorise quotations with 52 out of 58 (90%) students rating it as "very useful" and a further four as "a bit useful". It was also rated as the most useful approach used by students during the intervention out of all the teacher-led and independent strategies they were shown to study *Macbeth*. In reply to the questionnaire instruction, "Please list and explain any other strategies you found useful in helping you learn / remember quotations" 34 out of the 52 students (65%) who responded to this section included dual-coded revision cards as a useful strategy. Most students simply listed "revision cards with pictures on", or "drawing the pictures for the quotes" as being useful. However, others explained that it helped, "to use your own drawings to remember it better"; "draw funny drawings so you remember them" and "revision cards (with

pictures) – I can remember the picture if it makes me laugh or looks unusual." The most beneficial teacher-led method was the use of regular 3-minute recall sessions in class. Out of 59 students, 33 (56%) perceived it as "very useful" and 23 (39%) as "a bit useful". Although only 5 students specifically mentioned 3-minute recall as a useful strategy on their questionnaire ("3-minute recall as it meant we could never forget stuff"), a further 12 referenced it less explicitly with comments such as, "writing out 10 different quotes from different charcter [sic] in lesson in a short space of time from memory; and "going round the class having to say a new quote." Three student comments about the least useful thing they had learn during the study mentioned dual-coding. Two of these were because they had not found it useful and the other, "because if you can't draw. Sometimes you can't even understand what you draw." Despite this, overall students appeared to find making revision cards to use with spaced learning useful, "as they help me learn the quotes I need to learn by testing myself on them nearly every day." Additionally, one of the students who reported not finding dual-coding useful did find that, "Learning how to successfully carry out spaced-learning was effective for me and really helped to improve my recall." Other students also considered spaced learning to be a helpful independent approach. Eighteen valued it as "very useful" and a further 39 as "a bit useful". Twelve students directly referenced "spaced learning" as a useful strategy in their questionnaire response to listing strategies that helped them learn quotations, such as "spaced learning – because it helps it stick in my mind." A further eight made comments that referred less explicitly to spaced learning, but their answers appeared to suggest that they had found it as useful approach. Examples included: "having them in different piles of which I need to learn" and "split the quotes and learn them in parts."

A.5 Limitations

One of the principle limitations to the acceptability study was that the sample was not representative of the whole range of prior attainment levels of students that would be taking part in the wider study. Although participating students were all in Year 9, and therefore at the same academic stage as the students recruited for Study 1, they had all been placed into Set 1 for English. This meant that all participants had the highest levels of prior attainment for English in their year group and the lessons were not delivered to, or responses collected from, students with lower prior academic attainment. This was partially due to strategic constraints as the students participating in the acceptability study were taught by the researcher in their normal timetabled lessons. The study took place during the summer term and had been taught by the same teacher since the start of the academic year. Neither the researcher of the Head of English considered it to be in the students' best interests to change teachers for the purposes of conducting an acceptability study. Furthermore, as their regular timetabled teacher, the researcher felt that delivering the lessons would afford a useful opportunity to find out if the lessons could feasibly be taught by a classroom teacher and if it was possible to get through the lesson content within the duration of the study. However, although the sample was not representative of students with lower prior attainment, the researcher was also a teacher with over 16 years of teaching expertise and had held previous leadership roles within an English department and had significant experience in designing curricula for students of all academic attainment ranges. The researcher drew on their experience of teaching a wide range of student attainment levels and Study 1 was purposefully designed to make it accessible as possible and the lessons contained different materials to try and make the text as comprehensive as possible to students in lower attainment groups, and with lower chronological reading ages than those participating in the acceptability study. A key consideration was helping all students, regardless of attainment level, understand the events taking place in key scenes and the wider play before

unpicking Shakespeare's language and resources were provided to support all students with this. These included providing contemporary versions of key extracts alongside the original extract, including clips from film and stage versions of the play to see it brought to life and a glossary on slides with the original text. Additional resources were also provided that classroom teachers were able to use with their classes if they required extra support in understanding the text. Examples included, providing links to *Audiopi* (a website subscribed to by the participating school, which contains lectures on a series of GCSE English literature texts), and short video clips where actors playing the characters of Macbeth and Lady Macbeth discussed scenes in detail. In the teacher training for delivering the lessons teachers were told that they could take longer delivering the scheme, if students needed to work at a slower pace, as long as they adhered to the lesson order and structure of the unit. Teachers were also allowed to create additional resources to help students understand the text, as long as these were approved by the researcher first, and then documented. However, no teacher did this. Although the acceptability study did allow for the researcher to gain student perceptions of the intervention it was not possible for any other teachers in the English department to deliver the acceptability study and therefore gain pedagogical feedback from experienced classroom teachers. Ideally, a randomised pilot study would have been completed before the final study was run; however, school timetabling constraints made this unfeasible.

A.6 Adaptations made to Study 1

Student responses to the acceptability study questionnaire indicated that were several approaches from the intervention that they found most useful in helping them increase self-attainment, self-efficacy, memorise quotations and in reducing their academic anxiety. These included: teacher modelling: the use of the 3-minute recall; use of dual-coded revision cards, and spaced learning. Consequently, some adaptations were made to the initial study to ensure

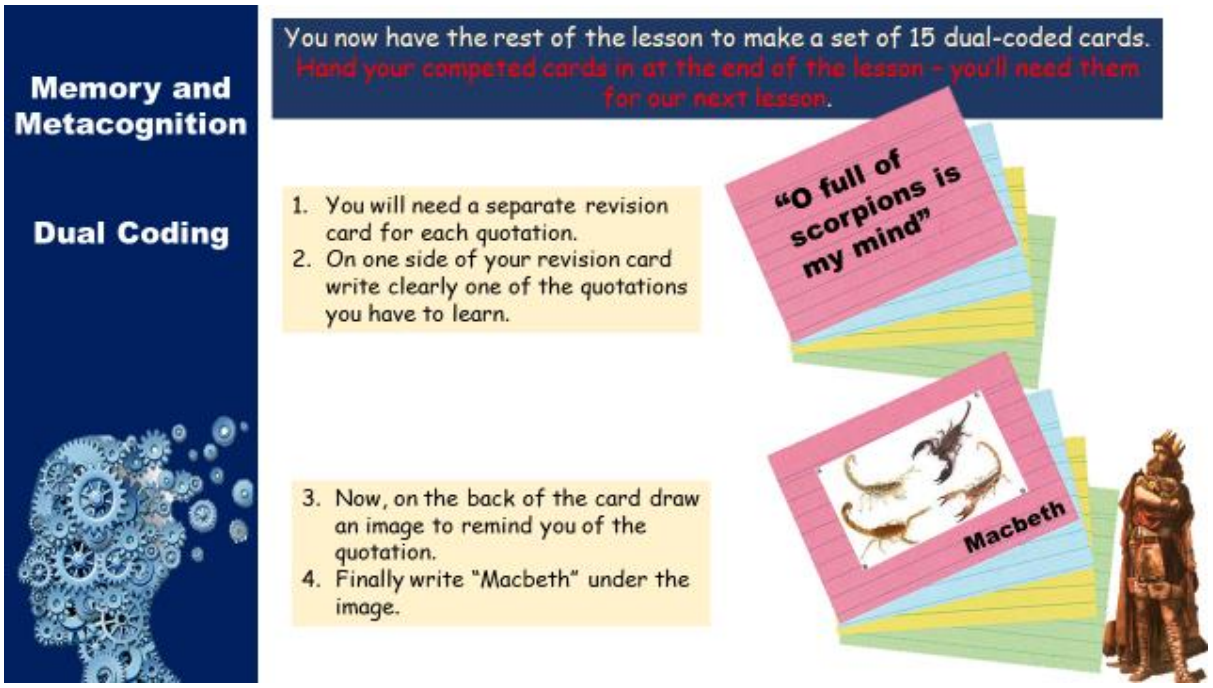
that these strategies were put at the forefront of the intervention. However, discussions with teachers delivering the terminated study also revealed that some teachers had more expertise and knowledge of how to deliver some of the strategies than other colleagues within the department and that adopting a more uniform approach in the instruction of these strategies would be beneficial. As a result of this, additional materials were developed, sourced and included to help ensure that all students were exposed to the same instructions about how to use the strategies and that they were primarily modelled by the researcher. Adaptations and additions to the lessons from the original study design are outlined in the rest of this section.

A.6.1 Instructional videos

Four instructional videos were created and presented by the researcher to explicitly model the use of the cognitive strategies to students in the treatment group following the metacognitive approach. These were created to ensure greater consistency over how the strategies were being explained to students and provide verbal explanations of how to implement these in their learning. For example, although year 10 and 11 students are asked to create revision cards for their GCSE English Literature texts in the participating school for homework, this had not previously been modelled and no uniform approach had been taken by the department. Furthermore, dual-coding had not been previously used to create revision cards by any of the teachers delivering the intervention and some teachers had not used this cognitive strategy before. The videos modelled how to: create dual-coded quotation cards; use spaced learning with dual-coded cards to memorise quotations; select appropriate extract quotations in an extract-based assessment, and write an effective long-form essay response. In all four videos, the researcher modelled how to tackle the tasks while explaining their thought process as they completed the tasks. Examples of completed work were shown when appropriate (such as for dual-coded revision cards) and students were then given the opportunity to apply the learning

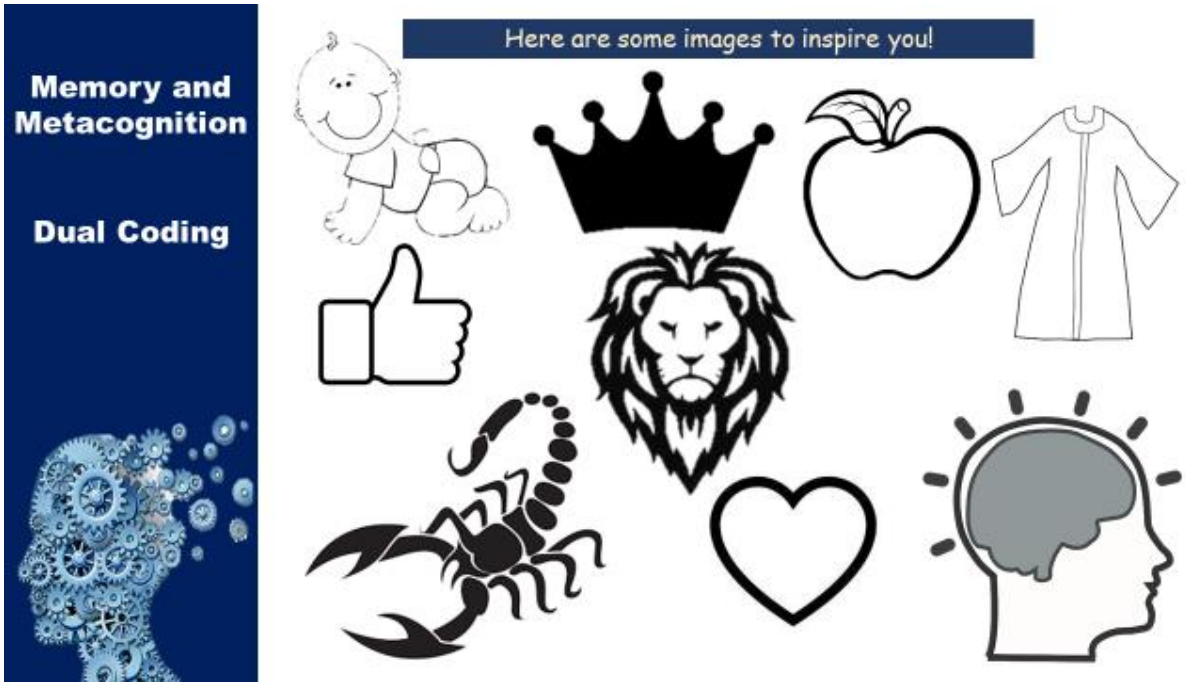
from these videos in their work, or practice the skills immediately after the video had been shown. For example, in the video instructing students how to create dual-coded revision cards, they were given the rest of the lesson (40 minutes) to create their own cards. Instructions were provided on the PowerPoint slide to prompt students how to tackle the task.

Figure A.5 *Lesson slide with dual-coded card prompts*



As this was the first time that students had tackled the task, and to help support lower attaining students who may need further support in identifying and selecting images to use in their quotations they were also given access to some images they could use, which related to the quotations.

Figure A.6 *lesson slide with dual-coded card suggested images*

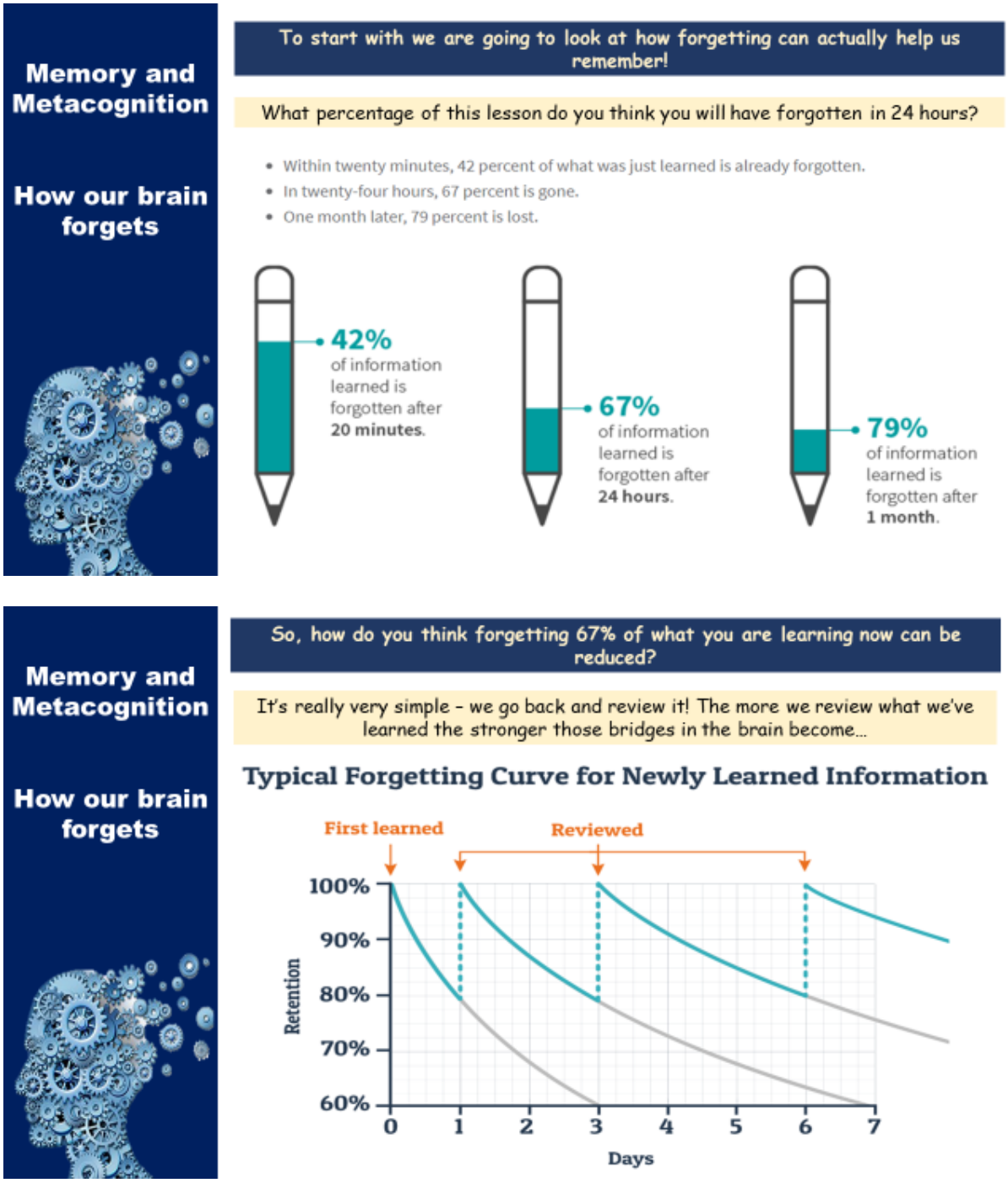


Instructional videos were only shown for the first time that students tackled the four strategies in the metacognitive intervention. Any further modelling was delivered by the classroom teacher; however, teachers were able to reshow the videos to remind students how they might tackle similar tasks if they wished to.

A.6.2 Theoretical understanding

In addition to showing students how to use these approaches, each strategy was also introduced with a brief explanation of the theory behind it to help them understand why they were useful. For example, at the start of the intervention, students in the experimental group were shown Catharine Young's TED-Ed clip entitled '*How memories form and how we lose them'* and a diagram of Ebbinghaus' Forgetting Curve (1885) to help them understand the importance of retrieval practice and how it linked to the 3-minute recall memory tasks in each lesson.

Figure A.7 *Lesson slides with theoretical explanations*



In the first slide shown in Figure A.7, the image was animated so that students has to guess the percentage amount before the answer was revealed.

A.6.4 Teacher modelling

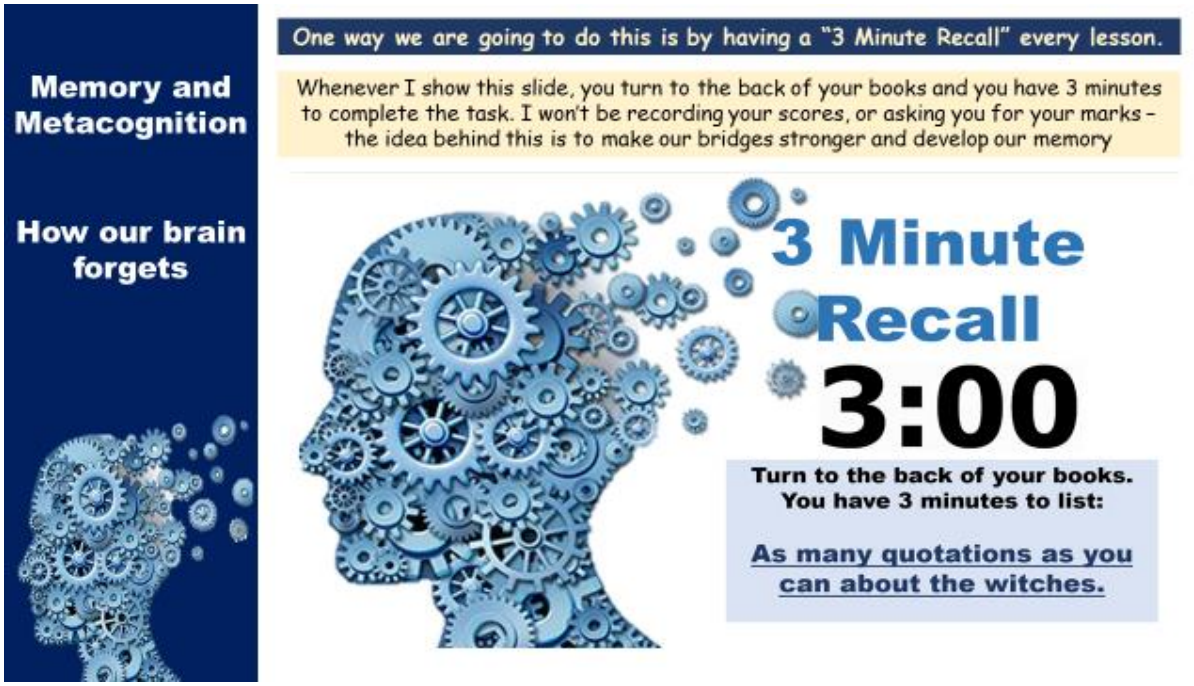
Given the positive student responses to the explicit modelling of how to write, plan, and self-assess assessments, and given the transferable nature of these strategies to other curriculum areas, there may be value in educational establishments adopting a whole-school approach, which explicitly and repeatedly demonstrates teachers' "expert" thinking to students. Thus, the metacognitive approach lessons for Study 1 was adapted to include as many opportunities as possible for teachers to model their writing and their thought processes. In contrast, the control group were given exemplar essay answers and paragraphs, which they could use to discuss what made a successful response, but the process of writing was not modelled. Furthermore, teachers in the training session for delivering the metacognitive approach were explicitly shown how to model essay writing with students and explain their thought processes. This included creating a classroom condition where every student was watching, listening to and contributing to what the teacher wrote, with the opportunity to copy it down as an example only after the model paragraph had been written. This was to ensure that all students were focussed and receptive to the live demonstration of analytical writing, rather than on trying to copy the answer without understanding how it had been created.

A.6.4 The 3-minute recall

Based on the positive student responses to the 3-minute recall in the acceptability study, this was developed in the metacognitive approach intervention to increase students' exposure to this strategy. In the scheme followed by participants of the acceptability study, 3-minute recall was done once every two or three lessons, usually as an Instant Challenge activity at the beginning of the lesson. This was changed so that a 3-minute challenge was included in every lesson during the experimental intervention lessons. To create more flexibility within these lessons and allow for the inclusion of different Instant Challenge activities, 3-minute challenges

were placed at strategic points, rather than at the start of each lesson. To help make making it easier for students to identify when they were employing this strategy, a template PowerPoint slide was created for the 3-minute recall activity (Figure A.8).

Figure A.8 *Lesson slide with timer added for the 3-minute recall*



When the slide was shown to students they had to complete the recall task on the screen. The template was adapted for each lesson, to include the exact recall task the students needed to complete, so that all experimental participants were exposed to the same tasks. A 3-minute timer was also added to the slide to ensure that that each participant had an equal amount of time allocated to the task and to standardise task conditions across for all classes.

A.7 Consent letter and form sent to parents: acceptability study

Dear Parent / Carer,

I am currently carrying out a research project, at the University of York, to investigate the effect of teaching metacognition on student attainment, self-efficacy, memory skills, and academic anxiety. I am writing to ask you consent for your child to complete an anonymised questionnaire to find out what they think about this approach to teaching.

Before agreeing to take part, please read this information sheet carefully and let us know if anything is unclear or you would like further information. Please also read the information about GDPR that is provided on a separate sheet

What would this mean for your child?

As part of their normal timetabled English lessons, your child has been learning about metacognition and the different strategies they can use to help them develop memory skills and tackle examination questions. This has been linked to their study of *Macbeth,* and all students have also studied the required subject knowledge of the play, as required in Year 9. I would like to research students' attitudes towards learning about metacognition and different learning strategies as part of an acceptability study for my research. All responses will be anonymous, and your child will not be able to be individually identified from the questionnaire. No other data, or information about your child is required for this study.

Storing and using your data

Results will be stored on a password protected computer. Your child's personal information is not needed for this study and will not be used. Only the researcher will have access to the questionnaires and these will be stored in a locked filing cabinet. The research questionnaires will be kept until December 2024, after which time they will be destroyed, in line with GDPR requirements. The results may be used in future analysis and shared for training, or research purposes, but students will not be identified individually. If you do not want your child to take part in the study, please tick the "opt out" section of the consent form.

Please note: if I gather any information that raises concern about your child's safety, or the safety of others, I may pass this information onto another person.

I hope you will agree to your child taking part in the study. If you have any questions about the project that you would like to ask before giving consent, please feel free to contact me by email sjr128@york.ac.uk, or the Chair of Ethics Committee via email education-research-administrator@york.ac.uk. If you are still dissatisfied, please contact the University's Data Protection Officer at dataprotection@york.ac.uk

If you are happy for your child to participate, please complete the attached form, which can be handed in to myself in L5, or the English Office.

Please keep this information for your own records.

Yours sincerely

XXXXX

PhD research student, University of York

Acceptability Questionnaire Consent Form

An information letter is attached to this form. Please read it carefully before making a decision about letting your child complete the questionnaire as part of this study.

Please note that even if you do decide to let your child complete the questionnaire now, you are free to change your mind at any point in the study.

Please tick each box if you are happy to take part in this research.

I confirm that I have read and understood the information given to me about the above named research project and I understand that this will involve me/my child taking part as described above.	
I understand that participation in this study is voluntary.	
I understand that my data will not be identifiable and the data may be used in publications, presentations and online.	
I confirm that I have read the information about GDPR	
I **give** consent for my child to complete the questionnaire required for this study.	
I **do not give** consent for my child to complete the questionnaire required for this study.	

NAME_____

SIGNATURE_____

DATE_____

Appenxix B

Figure B.1 *Success criteria: Shakespeare component of Eduqas GCSE English literature examination*

SECTION A (SHAKESPEARE)

GENERIC ASSESSMENT OBJECTIVES GRIDS

Questions 1-5 *(a)* (extract)

The following descriptions have been provided to indicate the way in which progression within the criteria is likely to occur. Each successive description assumes demonstration of achievements in lower bands.

AO1 and AO2 are equally weighted in this question.

Total 15 marks

Band	AO1:1a+b, AO1:2	AO2
5 **13-15 marks**	Candidates: sustain focus on the task, including overview, convey ideas with consistent coherence and use an appropriate register; use a sensitive and evaluative approach to the task and analyse the text critically; show a perceptive understanding of the text, engaging fully, perhaps with some originality in their personal response; their responses include pertinent, direct references from across the text, including quotations.	Candidates: analyse and appreciate writers' use of language, form and structure; make assured reference to meanings and effects exploring and evaluating the way meaning and ideas are conveyed through language structure and form; use precise subject terminology in an appropriate context.
4 **10-12 marks**	Candidates: sustain focus on the task, convey ideas with coherence and use an appropriate register; use a thoughtful approach to the task; show a secure understanding of key aspects of the text, with considerable engagement; support and justify their responses by well-chosen direct reference to the text, including quotations.	Candidates: discuss and increasingly analyse writers' use of language, form and structure; make thoughtful reference to the meanings and effects of stylistic features used by the writer; use apt subject terminology.
3 **7-9 marks**	Candidates: focus on the task, convey ideas with general coherence and use a mostly appropriate register; use a straightforward approach to the task; show an understanding of key aspects of the text, with engagement; support and justify their responses by appropriate direct reference to the text, including quotations.	Candidates: comment on and begin to analyse writers' use of language, form and structure; make some reference to meanings and effects; use relevant subject terminology.
2 **4-6 marks**	Candidates: have some focus on the task, convey ideas with some coherence and sometimes use an appropriate register; use a limited approach to the task; show some understanding of key aspects of the text, with some engagement; support and justify their responses by some direct reference to the text, including some quotations.	Candidates: recognise and make simple comments on writers' use of language, form and structure; may make limited reference to meanings and effects; may use some relevant subject terminology.
1 **1-3 marks**	Candidates: have limited focus on the task, convey ideas with occasional coherence and may sometimes use an appropriate register; use a simple approach to the task; show a basic understanding of some key aspects of the text, with a little engagement; may support and justify their responses by some general reference to the text, perhaps including some quotations.	Candidates: may make generalised comments on writers' use of language, form and structure; may make basic reference to meanings and effects; may use some subject terminology but not always accurately.
0 marks	Nothing worthy of credit.	Nothing worthy of credit.

Figure B.2 *Pintrich's table of Descriptive Statistics, Internal Reliability Coefficients with Final course Grade for Motivation and Learning Strategy Scales (Pintrich, 1993)*

Scale	*M* (*SD*)	Coefficient Alpha	*r* with Final Course Grade
Motivation Scales			
Intrinsic Goal Orientation	5.03 (1.09)	.74	.25
Extrinsic Goal Orientation	5.03 (1.23)	.62	.02
Task Value	5.54 (1.25)	.90	.22
Control of Learning Beliefs	5.74 (.98)	.68	.13
Self-Efficacy for Learning and Performance	5.47 (1.14)	.93	.41
Test Anxiety	3.63 (1.50)	.80	−.27
Learning Strategy Scales			
Rehearsal	4.53 (1.35)	.69	.05
Elaboration	4.91 (1.08)	.75	.22
Organization	4.14 (1.33)	.64	.17
Critical Thinking	4.16 (1.28)	.80	.15
Metacognitive Self-Regulation	4.54 (.90)	.79	.30
Time and Study Environment Management	4.87 (1.05)	.76	.28
Effort Regulation	5.25 (1.10)	.69	.32
Peer Learning	2.89 (1.53)	.76	−.06
Help-Seeking	3.84 (1.23)	.52	.02

Figure B.3 *Psychometric scoring questionnaire for Study 1*

Name		English group						
	Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	I believe I will receive an excellent grade in this class (English).							
2	I am certain I can understand the most difficult reading material in this course (English).							
3	I am confident I can understand the basic concepts (ideas) taught in this course (English).							
4	I am confident I can understand the most difficult material presented by the teacher in this course (English).							
5	I am confident I can do an excellent job on the assignments and tests in this course (English).							
6	I expect to do well in this class (English).							
7	I am certain I can master the skills being taught in this class (English).							
8	Considering the difficulty of the course (English), the teacher, and my skills I think I will do well in this class.							
TOTAL								
9	When I take a test I think about how poorly (badly) I am doing compared with other students in English.							
10	When I take a test I think about other parts of the test I can't answer in this subject.							
11	When I take tests I think of the consequences of failing in English.							
12	I have an uneasy upset feeling when I take an exam in English.							
13	I feel my heart beating fast when I take an exam in English.							
TOTAL								
14	During class time (English) I often miss important points because I'm thinking of other things.							
15	When I'm reading for this course (English) I make up questions to help focus my reading.							
16	When I become confused about something I'm reading for English. I go back to try and work it out.							
17	If course materials are difficult to understand (in English) I change the way I read the material.							
18	Before I study new course material thoroughly (in English) I often skim it to see how it is organised							
19	I ask myself questions to make sure I understand the material I have been studying in class (in English).							
20	I try to change the way I study in order to fit in the course requirements and the teacher's teaching style.							
21	I often find I have been reading for class (in English) but don't know what it was all about.							
22	I try to think through a topic and decide what I am supposed to be learning from it (in English) rather than just reading over it when studying.							
23	When studying for this course (English) I try to work out which ideas I don't understand well.							
24	When I study for this class (English), I set goals for myself to in order to direct my activities in each study period.							
25	If I get confused taking notes in class (English), I make sure I sort it out afterwards.							
TOTAL								

1= "Not true at all of me." **7= "very true of me"**

B.1 Consent letter and form sent to parents: Study 1

Dear Parent / Carer,

I am currently carrying out a research project, at The University of York, to investigate the effect of teaching metacognition on student attainment, self-efficacy, memory skills, and academic anxiety. I am writing to ask you consent for your child to take part in the study.

What would this mean for your child?

As part of their normal timetabled English lessons, your child will be learning about the GCSE Literature text, *Macbeth*. There is increasing research evidence that students who have an understanding about metacognition and self-regulation can improve their academic attainment. I would like to research whether an explicit approach to teaching metacognition, combined with a subject knowledge-based approach can help students: achieve higher grades in their *Macbeth* assessments; remember more quotations; increase their belief that they are able to complete learning tasks successfully, and reduce how much they worry about examinations.

I would like your child to be included in this research project. This would involve being one of a randomly allocated group of students either following a 10-week programme of learning that combines metacognition with subject knowledge (*Macbeth*), or participating in their normal subject-based (*Macbeth*) English lessons. This will begin at the start of the spring term 2021. If you choose not to let your child take part in the study, they will participate in their normal time-tabled English lessons, as usual, but their attainment data will not be used in the research.

Storing and using your data

Macbeth assessment results, self-scored self-efficacy and academic anxiety results will be stored on a password protected computer. Copies of your child's assessments will be stored in a locked filing cabinet in the researcher's office that only the researcher has access to. Although I will need to record your child's name and English set on any assessments, research data will be coded so that they are not identifiable to anyone apart from the researcher. The results may be used in future analysis and shared for training, or research purposes, but students will not be identified individually. If you do not want your child to take part in the study, please tick the "opt out" section of the consent form.

Please note: if I gather any information that raises concern about your child's safety, or the safety of others, I may pass this information onto another person.

I hope you will agree to your child taking part in the study. If you have any questions about the project that you would like to ask before giving consent, please feel free to contact me by email sjr128@york.ac.uk, or the Chair of Ethics Committee via email education-research-administrator@york.ac.uk.

If you are happy for your child to participate, please complete the attached form, which can be handed in to your child's English teacher.

Please keep this information for your own records.

Yours sincerely.

XXX

PhD research student, University of York

Metacognition Study Consent Form

An information letter is attached to this form. Please read it carefully before making a decision about letting your child complete the questionnaire as part of this study.

Please note that even if you do decide to let your child participate now, you are free to change your mind at any point in the study.

I have read and understood the information letter and **give** consent for my child to participate in this research project and for their anonymised data to be used as part of this study. ☐

I have read and understood the information letter and **do not give** consent for my child's anonymised data to be used as part of this study. ☐

Name of student:

Name of parent:

Parental signature:

Date:

Appendix C

Table C.1 *Subject specialism classification categories*

Code	Category	Subjects included in the classification
1	English and Media	English Language English Literature Media Studies
2	Mathematics	Mathematics Statistics
3	Science	Physics Biology Chemistry Combined Sciences
4	Social Sciences	History Geography Psychology Religious Education Law Sociology Criminology Classical Civilisation PSHC Government and Politics
5	Languages	French German Spanish Latin
6	Special Educational Needs (SEN)	Special Educational Needs Co-ordinator (SENCO) Special Educational Needs (SEN) Teacher
7	Performing Arts	Drama Music Music Technology Physical Education
8	Computing	Business Studies Digital Media Production Technology Computing Creative iMedia Computer Science
9	Technology / Vocational Subjects	Customer Services Health and Social Care Public Services Food & Textile Technology Food Preparation and Nutrition

Figure C.1 *Metacognitive Awareness Inventory for Teachers (Balcikanli, 2011)*

Statements
Factor I- Declarative Knowledge
1- I am aware of the strengths and weaknesses in my teaching.
7- I know what skills are most important in order to be a good teacher.
13- I have control over how well I teach.
19- I know what I am expected to teach.
Factor II- Procedural Knowledge
2- I try to use teaching techniques that worked in the past.
8- I have a specific reason for choosing each teaching technique I use in class.
14. I am aware of what teaching techniques I use while I am teaching.
20. I use helpful teaching techniques automatically.
Factor III- Conditional Knowledge
3- I use my strengths to compensate for my weaknesses in my teaching.
9- I can motivate myself to teach when I really need to teach.
15- I use different teaching techniques depending on the situation.
21- I know when each teaching technique I use will be most effective.
Factor IV- Planning
4- I pace myself while I am teaching in order to have enough time.
10- I set my specific teaching goals before I start teaching.
16- I ask myself questions about the teaching materials I am going to use.
22- I organize my time to best accomplish my teaching goals.
Factor V- Monitoring
5- I ask myself periodically if I meet my teaching goals while I am teaching.
11- I find myself assessing how useful my teaching techniques are while I am teaching.
17- I check regularly to what extent my students comprehend the topic while I am teaching.
23- I ask myself questions about how well I am doing while I am teaching.
Factor VI- Evaluating
6- I ask myself how well I have accomplished my teaching goals once I am finished.
12- I ask myself if I could have used different techniques after each teaching experience.
18- After teaching a point. I ask myself if I'd teach it more effectively next time.
24- I ask myself if I have considered all possible techniques after teaching a point.

Figure C.2 *Teacher self-efficacy scale (Schwarzer et al., 1999)*

1. I am convinced that I am able to successfully teach all relevant subject content to even the most difficult students.
2. I know that I can maintain a positive relationship with parents even when tensions arise.
3. When I try really hard, I am able to reach even the most difficult students.
4. I am convinced that, as time goes by, I will continue to become more and more capable of helping to address my students‘ needs.
5. Even if I get disrupted while teaching, I am confident that I can maintain my composure and continue to teach well.
6. I am confident in my ability to be responsive to my students‘ needs even if I am having a bad day.
7. If I try hard enough, I know that I can exert a positive influence on both the personal and academic development of my students.
8. I am convinced that I can develop creative ways to cope with system constraints (such as budget cuts and other administrative problems) and continue to teach well.
9. I know that I can motivate my students to participate in innovative projects.
10. I know that I can carry out innovative projects even when I am opposed by skeptical colleagues.

Response format:
(1) not at all true, (2) barely true, (3) moderately true, (4) exactly true

C.1 Teacher consent and information form: Study 2

Teacher attitudes towards, and use of metacognition and self-regulated learning in the classroom.

This survey is intended for qualified teachers of Key Stages 1-5 currently teaching in the United Kingdom.

Dear Participant,

This is an invitation to participate in the following research project, aimed at understanding teacher attitudes towards, and understanding of metacognition, self-regulated learning, and academic learning strategies. It is also investigating if teacher understanding of, and attitudes towards, metacognition are associated with higher levels of self-efficacy in their pedagogy.

Before continuing, please read this information carefully:

This research project is being conducted by XXX, a Department of Education postgraduate student at the University of York. You are invited to take part in a questionnaire which will take approximately **15 minutes** to complete. Questions will relate to both your own attitudes and understanding of metacognition and self-efficacy. The information you provide will support an understanding of teacher attitudes towards and use of metacognition in the classroom.

Storing and using your data
All of the data collected for this study will be anonymous. We will not ask for your name or any other identifying information. The data will be stored in a password protected file and will only be accessible to the researcher involved in the project. The anonymous data may be used in presentations, online, in research reports, in project summaries or similar. In addition, the anonymous data may be used for further analysis. Your individual data will not be identifiable but if you do not want the data to be used in this way please do not complete the questionnaire. Since we are practising Open Science, anonymised data will be stored indefinitely with the University's Research Data York service or in other open research data repositories.

Participation is voluntary
If you do agree to complete the questionnaire you are free to leave any questions unanswered or to stop completing the questionnaire altogether at any point. Once the questionnaire is submitted the data cannot be withdrawn as it is anonymous so there will be no way to identify your data.

Questions or Concerns
This research has been approved by the Department of Education, University of York Ethics Committee. If you have any questions or complaints about this research please contact XXXX (sjr128@york.ac.uk) or Chair of the Ethics Committee (education-research-administrator@york.ac.uk).

By submitting this questionnaire, you are agreeing to all of the points above.

Many thanks for your help with this research project.

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