The Impact Of Metacognitive Ability On Critical Thinking, Amongst Student Experiences Of Learning At University, From A Mixed Methods Approach.

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Abstract

Metacognition, otherwise known as the process of being aware of ones thoughts and thinking process, has been increasingly used across many student groups in which metacognitive strategies enable individuals to gain power over their thinking by provoking behaviours that increase their efficiency to plan, monitor and evaluate thought processes, such as problem-solving (Luckey, 2003). The present research therefore aims to further explore the advantages of metacognition and how this can improve critical thinking ability for complex material. However, in light of the Coronavirus (COVID-19) pandemic, specific participants would later be identified in an ample opportunity to explore such learning experiences further. As such from a qualitative perspective, the present research will explore the essence of this lived experience in regards to how learning at university is perceived by such students. In addition, as an extension of previous findings, research will also aim to explore how wider social forces, drawing reference to the connection of social systems (Bronfenbrenner, 1994) specifically interact with the individual level, and contribute or influence on learning. A mixed method approach via a convergent parallel design was therefore used for the advantage of the opportunities afforded by mixing both quantitative and qualitative data, to increase the usefulness and application of findings and to gain further insight to the research from a different perspective. Findings appear to extend on the notion that metacognitive awareness is important to consider within education, enhancing elements such as critical thinking ability and self regulatory processes during learning (Rhodes, 2019), however that we also cannot separate or measure elements of learning away from individual and the social and cultural world that they inhabit. The socio-cultural context was also of importance to consider in which academic competence being used to determine self worth or success, anxiety, and fluidities in identity during transition to higher education appeared to be considered the 'norm' for individuals in today's learning environment.

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1. To examine how metacognitive strategies will vary for students with different levels of metacognitive ability, and how this depicts higher levels of critical thinking ability.

1.1 Metacognition

Metacognition is otherwise known as the process of being aware of ones thoughts and thinking process, for example the process of an individual recognizing themselves as a thinker and acknowledging any thought processes they carry out when performing tasks (Weinert, 1987). In other words, it considers a variety of processes featured by the individual to monitor cognitions in an attempt regulate their own behaviour (Rhodes, 2019). This phenomenon of 'thinking about thinking' can be argued to have roots in some of the earliest writings of memory strategies (Yates, 1966), in contrast to metacognition itself only having been empirically investigated throughout the previous few decades (Dunlosky and Metcalfe, 2009).

Brown et al., (1983) considered areas of research that illustrated key theoretical questions regarding the interactive and dynamic nature of learning, and argued that processes earning the title 'metacognitive' are in fact central to the concept of learning. Within this Brown et al., (1983) argued that the term 'metacognition' has commonly been utilised when referring to two very distinct areas of research, i.e. the regulation and knowledge of cognition, in which these two forms are largely interlinked. One area feeds on the other and an attempt to separate them has often led to oversimplification of the concept, however they are readily distinguishable.

Investigating further into metacognitive learning mechanisms from previous decades, Brown et al., (1983) explored the notion of how individuals came to be capable of learning on their own, however, now research can be considered guided by the cognitive theory of learning. A key aspect known as 'academic cognition' was presented arguing that deliberate, and often painful, attempts to learn demand cognitive efficiency, i.e. that it takes time and effort. Studies reviewed in this research were inspired by the metacognitive 'boom' in literature and therefore moved away from the usual cross-sectional age comparison approach, and instead explored analyses of children that were learning to develop self-regulatory skills and encouraged to learn-by-doing on their own. However, despite schools measuring success largely in terms of independent competence, Brown et al., (1983) claimed

that a large proportion of learning exists socially, and that concepts appearing to promote metacognition, such as 'academic cognition', are often limited due to the focus being on methods required for efficiency in contrast to paying attention to other elements, such as emotive factors, that may actually facilitate or hinder such efficiency.

Furthermore, Tarricone (2011) provided insight into how metacognition has moved through what Brown et al (1983) described as the third stage of theorisation resulting in a comprehensive understanding of the construct, represented through contributions demonstrated in the taxonomy and conceptual framework of metacognition. The final taxonomy of metacognition was partially portrayed as a framework, continuum and `a comprehensive research and development system' (Anderson and Krathwohl, 2001), reflecting knowledge components (such as procedural, conditional and declarative knowledge), how cognition and executive functioning are regulated, alongside metacognitive experiences. This framework depicts the categorisation and representation of metacognition categories, super categories, subcategories, key elements, and other elements of metacognition, in a detailed and comprehensive manner.

However, whilst it was perhaps not intended for the taxonomy of metacognition to be read as a definitive hierarchical framework, classified into higher-order and lower-order processes, it does in fact have levels which are grouped by labels such as these, e.g. categories and super categories. In this light it can be argued that a taxonomic approach to cognitive skills such as metacognition is problematical, as it presumes that the lower-order class is necessary to create the higher-order class (Hauenstein, 1998). Tarricone (2011) argues however that these categorisations were developed within theoretical and empirical research, and were therefore grouped in terms of their similarities. However, Tarricone's (2011) main findings, supported by the conceptual framework of metacognition, suggest that metacognitive processes are interactive. Therefore, despite categories of metacognition being developed and classified, it is important to note that the construct is interactive and therefore that the processes themselves are also interactive (Tarricone, 2011). As such, whilst providing a rich and detailed overview for specific studies on isolated variables of metacognition, this research would imply that further research into other areas, for example metacognition and motivation, or metacognition and the self during problem solving, is required.

1.2. Metacognitive Ability Within Students

Despite these elements however, the prevalence and awareness of metacognition in the past few decades has undoubtedly risen, alongside metacognitive strategies being increasingly used across many groups of individuals, primarily students. Such

strategies have often been considered effective in enabling individuals to gain power over their thinking by provoking behaviours that increase their efficiency to plan, monitor and evaluate thought processes, such as problem-solving (Luckey, 2003). This interest developed after factors such as students often reporting having felt prepared for an academic test or exam, only to receive a grade that proves this expectation to be incorrect (Rhodes, 2019). This discrepancy is argued to be an important moment in education as individuals start to consider and engage in metacognition, or begin to possess insight about such 'cognitive phenomena' (Flavell, 1979).

As a result, metacognition has been a topic of vast interest within related literature, as utilising such strategies that help increase awareness of an individual's metacognition are often seen to improve many aspects, for example language training strategies and comprehension when reading, alongside critical thinking (Boulware-Gooden et al., 2007). Similarly, research with a focus on how these strategies can be applied across a student population suggested that students who have a greater awareness of methods regarding metacognition typically produced results of comprehension tests, such as laboratory reports and papers, that undergraduates complete within their degree (Yuksel and Yuksel, 2011). This is reportedly due to metacognitive skills enhancing attentional control by strengthening the goal directed system of working memory (Eysenck et al., 2007).

Furthermore, Haryani et al., (2018) proposed that metacognitive ability reflects a cognitive processes in which an individual may possess a state of consciousness for when regarding controlling, examining and organising the thinking process. Alongside scientific reasoning, such mental activity and cognitive skill involved regarding the process of discovery, judgment, conclusion, and argumentation, is the combination of techniques that may determine a student's proficiency for learning. In this light, the effect of problem based learning on the utilisation of metacognitive strategies and ability to reason amongst students was investigated, suggesting that various steps in problem-based learning do impact on metacognition, alongside this being used to help students improve on reasoning skills when asked to problem solve (Haryani et al., 2018).

In a similar light, the result of instructing within metacognitive or cognitive learning skills on metacognitive ability amongst students was explored via the use of a Metacognitive-Strategy Worksheet (MSW) to promote students' use of such strategies while solving problems (Yang and Lee, 2013). Results of the study indicated that although the impact of instruction upon strategies of metacognition was not statistically significant in effecting an individuals overall metacognitive ability, it perhaps benefited their strategy use. As a result, once more it can be argued that the understanding of a material does not purely rely on an individual's

scientific knowledge or comprehension independently, more so that it is their reasoning processes and success of applying such information within a realistic setting that may promote a further understanding (Haryani et al., 2018).

As such it was suggested that utilising metacognitive mechanisms could be considered an important factor of learning and teaching strategies in many fields due to the possibility for individuals to improve upon selecting the most appropriate methods, monitoring acquired knowledge and assessing outcomes (Gaviria, 2019). However, Gaviria (2019) argues that we cannot overlook the possibility that metacognitive processes are especially susceptible to factors such as motivational influence, by virtue of its epistemic characteristics and its social implications. Gaviria (2019) suggests that ideological and identity commitments can affect the way learners monitor the quality of their understanding and control the application of their strategic knowledge when evaluating historical information. Similarly, recent research in the field of motivated cognition has also suggested that metacognitive functioning might be biased by motivational factors associated with individual beliefs or goals (Mangels et al., 2006).

1.2. Critical Thinking

Throughout the literature, higher-level critical thinking has often been acknowledged to facilitate better performance, regarding a desired outcome (Ku and Ho, 2010). Additionally, although the process of critical thinking cannot be accurately defined due to the sheer volume of processes that occur within the brain, it is widely suggested that the process contains metacognitive components (Halpern, 1989). Initially, it was argued that improvement of the thinking process must consider notions regarding how individuals represent and arrange information, in addition to how these internalisations fluctuate and oppose any changes in the face of fresh information (Schoen, 1983). Within this explanation, Schoen (1983) refers to knowledge improvement as the ability to critically think, alongside organisation of such knowledge as a metacognitive element. It is further suggested that tasks that incorporate such critical thinking skills, for example problem solving, are continuously expected of young people across a variety of settings, whether it is within education, the workplace or every day life (Halpern, 1998).

As such, Magno (2010) researched how metacognitive ability influences on critical thinking ability and predicted that when learners are able to utilise such metacognitive strategies to increase the likelihood of a preferred results, critical thinking may occur. Using the Watson-Glaser Critical Thinking Appraisal (WGCTA), (Watson and Glaser, 1961), such findings revealed that utilising metacognition significantly lead to critical thinking and that for both elements; all underlying factors were of significance. Importantly, this research helps detail how elements of the

metacognitive process appears dependent on the related variable, in opposition to prior literature that presented the notion of metacognition with various perspectives and components without consideration of variables it may be associated with (Magno, 2010). Due to a key skill of the learning process within education being suggested as the student's critical thinking ability, such prior presentations and viewpoints on metacognitive strategies seem to argue that acquiring knowledge is the main component within learning and relevant academic success, in contrast however, when outcomes of metacognitive ability are recognised a different outlook on the practicality of metacognition may be required (Pintrich, 2002).

Within this light the notion of improving a learners critical thinking ability via cognitive processes can be argued, however similarly that such components require key mental and cognitive skills, such as metacognition, from the executive level in order to attain the ability to critically think (Brown, 2004). As a result, Ku and Ho (2010) examined how various metacognitive strategies played a role amongst students who had similar cognitive skills and academic ability, but contrasting critical thinking skill. Findings indicated that the students who were greater in critical thinking also engaged in more metacognitive strategies such as high- level evaluating and planning. In this light, metacognitive ability and knowledge was viewed important for effective information regulation, portraying the benefits of developing learners' frequency of metacognitive strategies within critical thinking tasks (Ku and Ho, 2010).

1.3. State Anxiety

Research has also indicated that many young people, such as students, do actually possess the cognitive skills needed to efficiently carry out tasks that place emphasis on metacognitive ability, such as problem solving, but that they often fail to implement these skills efficiently and experience heightened state anxiety as a result (Mayer, 1998). In this light it is therefore suggested that individuals able to harness a better quality of thinking would also possess lower levels of such state anxiety, due to factors such as irrational thoughts and unclear thought processes being underlying mechanisms for maintaining environmentally stimulated anxiety (Spada et al., 2006).

Factors such as state anxiety (i.e. environmentally stimulated anxiety likely to be experienced in testing situations that students may frequently experience) can often affect attentional control and reduce attentional focus on task demands as a result, disrupting performance (Eysenck et al., 2007). In this light, Spada et al., (2009) explored the connection within metacognitions, state anxiety and attentional control amongst students a short time prior to their final exams. Results indicated that a positive correlation could be seen between various 'dimensions' of metacognitive

strategies (for example confidence from a cognitive outlook, beliefs regarding uncontrollability and danger, and controlling these via state anxiety). Additionally, such results presented the argument that various metacognitions, for example attention-focusing executive control or cognitions regarding uncontrollability and danger may also influence the notion of state anxiety.

In addition, exploration around how metacognitive beliefs align and change amongst perceived state anxiety within athletes, prior to competing, outlined that beliefs derived from the metacognitive process can act as predictive factors for state anxiety (Love et al., 2018). Similarly, after controlling for state anxiety, elements such as worry and cognitive anxiety were also found to be predictors in regards to how metacognitions related to concentration levels, with beliefs from metacognition also changing across 'time- to- the- event intervals'. Love et al., (2018) therefore argues that these results give support to a metacognitive framework being a viable and effective tool when encountering and controlling for state anxiety.

However more specifically, Matthews et al., (1999) investigated the concept of 'text anxiety' that refers to distress amongst anxiety provoking situations, such as school examinations, alongside what personal traits a learner may possess that may act as a predisposition to the notion of state anxiety. This was adapted from Wells and Matthews' (1994) 'General Model of Emotional Disorder', describing what processes within cognition are involved within state and trait anxiety during a test, such as worry, coping strategies or an over use of metacognition. Cognitive measures such as worry and metacognitions behind this, alongside coping strategies, did predict various components of state anxiety when exposed in a test setting. In light of this it can be argued that metacognitive ability may actually contribute to the monitoring of test- based anxiety so that it does not escalate and result in the total depletion of crucial attentional, regulatory and processing functions required for learning (Matthews et al., 1999). Literature appears to suggest that inadequate metacognitive functions and higher levels of anxiety are interlinked and it can therefore be argued that metacognition may actually influence state anxiety, resulting in better attentional focus on critical reasoning tasks (Dragan et al., 2010). However, whilst research in this area makes reference to the notion that an individual's disposition undoubtedly influences their level of thinking, contributing personal factors that may enhance factors such as state anxiety, e.g. a learner's, perceived self- worth or possible identity concepts, combined with trait anxiety are not widely accounted for.

1.4. Trait Anxiety

Trait anxiety refers to a section of the 'personality dimension' in which an individual may report a tendency to experience various negative emotions, including anxiety

across multiple situations (Gidron, 2013). Trait-anxious people have been argued to also experience state anxiety and vulnerability within situations in which the majority of observers may not, however such trait-based feelings of anxiety and other related concepts have often been rejected for not illuminating the etiological mechanisms of psychopathology (Nordahl et al., 2019). Within this light, Nordahl et al., (2019) argues that some metacognitive models present an argument in which elements, such as metacognitive ability, considered within trait terms can be viewed as a key function to trait-based anxiety and other relevant constructs. Research investigating how such metacognitions may operate as an underlying factor within trait-anxiety (and the relationship to depression and anxiety generally) showed that although trait anxiety portrayed greater stability over time, metacognitive beliefs, both negative and positive, influenced vulnerability in both these areas (Nordahl et al., 2019). Such results ultimately suggest that beliefs formed within the metacognitive process act as key predictors of elements associated with trait anxiety, such as vulnerability, in which an application of adapting metacognitive therapy in order to improve resilience psychologically may be present.

In extension, Matthews et al., (1999) also suggested that a student's state of distress and skills used to cope during the examination process showed the presence of 'trait test anxiety' and that this related once again to the presence of cognitive elements, such as worry and coping strategies, amongst metacognition. Consistent with the model of Wells and Matthews (1994), the link between cognitive processes and test anxiety may once more indicate that pathological test anxiety treatments may find benefits in reflecting a basis of metacognition (i.e. usage of cognitive-behavioural techniques) for the treatment of general anxiety states.

Furthermore, Dragan and Dragan (2013) examined the relationship that existed between maladaptive metacognitive strategies and tendencies, such as learner temperament and level of trait anxiety, amongst individuals reporting with anxiety disorders. Results argued that more precise associations existed between trait anxiety, temperament and elements of metacognition, as major traits relating to anxiety were found to feature the roles of perseveration and emotional reactivity. Importantly however, anxiety was found to be strongly associated with metacognition in which these results further highlight the significance of the relationship between temperament and trait-anxiety being influenced by cognitive processes, such as metacognitive ability. Similarly Irak and Tosun (2008) also predicted that metacognition would have a strong association with trait anxiety amongst individuals with obsessive–compulsive symptoms, mediating the relationship. Significant correlations were found between metacognition, obsessive–compulsive symptoms and anxiety but importantly these findings confirmed that it was metacognition that facilitated the relationship between OCD-type symptoms and anxiety. Additionally despite predictions, metacognitive beliefs regarding anxiety

did not differ amongst symptom subtypes, suggesting these are inherent to the individual's disposition.

It can also be argued that lowered notions of emotional intelligence may maintain anxious worrying, and therefore elevate greater trait-based anxiety, as this predisposes individuals to continually apply maladaptive coping strategies (Ghafoor et al., 2019). Results highlighted that predicted relationships between low emotional intelligence and lowered mental components were indeed facilitated by negative metacognitions and maladaptive coping strategies. However, whist this was true across a sample in Pakistan, further results from a German sample showed that individuals applied contrasting maladaptive coping strategies that also led to lower mental component scores, but did not posses a direct relation on emotional intelligence (Ghafoor et al., 2019). Importantly, these results highlight a great cultural difference when considering wider applications, and importantly the direct impact of maladaptive coping strategies within anxiety, despite initially appearing to support culture-independent validity of the metacognitive model. Emphasising areas of development required from within a cross-cultural context, this research highlights the importance of considering different cultures and the need for culture-specific modifications of psychosocial interventions when exploring factors such as metacognition and anxiety.

1.5 Motivation for Effort

As learners are often expected to complete educational work that heavily relies on the ability to critically think as part of their undergraduate degree (e.g. in laboratory reports), it is also important to acknowledge the individual at a dispositional level, as metacognitive ability would also undoubtedly influence personal factors such as self-worth, trait anxiety and sense of academic identity if it should fail students in producing results that are deemed acceptable (Ku and Ho, 2010). As such, the instance of metacognitive ability has become of increased importance to psychologists as if harnessed, such abilities would have huge practical benefits within educational settings, for example decreasing test-related anxiety and improving wellbeing in students (Cassady, 2004).

Two plausible possibilities for this phenomena are therefore that they are either not aware of their own metacognitive ability (i.e. the ability to plan, monitor and evaluate) or that their motivation is lacking due to personal attributes, such as self-worth or past negative experiences regarding academic work, contributing to the belief that they cannot do 'it' (Mayer, 1998). This aligns with the Self-worth Theory (Covington, 2000) assuming that students will base any concept of self-worth on various academic performances and achievements, resulting student's only valuing themselves as 'worthy' after having achieved the necessary grades they deem a

measure of self-worth. Students will therefore struggle to maintain this sense of worth and belonging in society which places a large emphasis on competency and doing well in academia, naturally raising anxiety upon receiving grades or feedback below their expectancy (Dweck, 2000). This may then result in intense affect (i.e. alteration of feelings and emotions) or fluctuations in aspects such as self-esteem, helplessness or identity (Crocker et al., 2003).

However, Ku and Ho (2010) particularly expanded on how effective implementing metacognitive strategies can be as learners found to demonstrate different uses of metacognitive strategies appeared to contrast in thinking performance, despite having similar levels of intelligence, cognitive skill and academic achievements. Results showed that those who were engaged in more metacognitive activities emerged as better critical thinkers. Whilst this research acknowledged that an individual's disposition would undoubtedly influence their level of thinking however, subjective factors such as a person's level of self-esteem, worry or anxiety were not accounted for. In addition a large proportion of research was not carried out in westernized culture making it difficult to apply findings, as societal values are likely to vary.

Introduction

It is important to note that due to the increased emphasis and advancement in technologies enabling interaction, there appears to be an apparent shift from individual, to more collaborative approaches to learning (Garrison and Akyol, 2014). The topic of metacognition was therefore approached as a phenomenon of interest firstly due to being considered a technique that helps prepare individuals to be more aware and think within a deeper context, thereby possibly improving performance, and ultimately helps students to understand how to deal with learning tasks, such as essays or other assessments (Hartman, 2001). This type of thinking has often been associated with scholars who are said to possess greater awareness of such factors, reducing anxiety and improving learning ability (Spada et al., 2006). In contrast however it is also apparent within the literature that most individuals tend to struggle with similar notions, such as critical thinking, due to having little knowledge on how to reason with such tasks (Schraw, 1998). Therefore, whilst it appears there is vast literature surrounding how metacognitive strategies can be effective when implemented, to increase factors such as critical thinking and performance, how individual attributes contribute towards academic strategies, such as self-worth, anxiety or sense of identity, features less within research.

Additionally, it can be argued that the study of metacognition brings with it many challenges, particularly when choosing a methodological standpoint as there is the recognition that metacognition is not just a private internal activity but also socially situated (Garrison and Akyol, 2014). Therefore, the challenge of researching metacognition emerges when research is conducted out of a clinical or highly structured setting, and in to a more naturalistic context with less structure due to the subjects' arrival within previously unexplored settings and social contexts, with little existing literature related to such study amongst social settings (Thomas, 2009). Research, such as exploration of the metacognition between parents and their children as they interacted in a naturalistic setting, has therefore been developed to inform future research in metacognition and provide examples for other under-researched learning phenomena, using interpretive qualitative methodologies such as hermeneutic dialectic process (Anderson and Thomas, 2014). However, in depth literature in such areas from a qualitative viewpoint still remains lacking, highlighting the need for different approaches that may consider both the phenomenon of metacognition alongside the first-hand experience of the individual within the relevant context. In addition, varied approaches that bridge these two areas together is also lacking within the literature. The present research will therefore aim to address such gaps in the literature by firstly examining the differences in metacognitive strategies for different students and how this depicts other factors,

such as critical thinking ability. Additionally, it will also aim to explore the lived experiences of learning throughout university from a student's perspective.

The Individual and Internal Mechanisms of Learning

In an attempt to understand the role of the individual in regards to internal mechanisms of learning, such as self-regulated learning and developing a sense of rhetorical consciousness, journals collected throughout a term of study from students within a grounded theory approach suggested that a link may exist between the individual student's metacognitive awareness and their own perception of the task (Negretti, 2012). In this way, awareness was suggested to be reciprocal to internal self-regulation and the student's own development of their individual writing approaches, which then changed over the time of their learning. This research begins to suggest meaning in the form of the individual developing an awareness and internal mechanisms of learning developing over time, importantly however, it highlights that further exploration around the role of the individual in carrying out their own learning choices within an environment is perhaps required.

Additionally, within the literature it has been acknowledged that it becomes essential for students to develop an understanding of their own knowledge and learning processes (Garrison and Akyol, 2014). Known as the metacognition of learning or 'meta-learning', this regards the process of individuals recognising the effectiveness of their internal learning techniques and becoming more aware of their self-regulatory processes (Colthorpe et al., 2018). Research therefore aimed at increasing student's self-awareness indicated that most students reported a positive impact on their learning, as they prompted processes of forethought and self-reflection. However, students were either found to change or not change their study strategies, in which the students that did not change believed their study approaches were the most effective in contrast to students who adapted and demonstrated significantly improved performance across their learning (Colthorpe et al., 2018). This process of prompting students to become more self-reflective and independent learners, via the process of self- reflection and adaption to learning, encouraged the development of lifelong learning skills and suggested that individuals can elicit control in their own learning experiences.

Furthermore, within an exploratory study of student self-inquiry, research aimed at providing techniques that could lead to achieving higher forms of cognition, and progression towards integrative learning, presented results that indicated students who received metacognitive instruction could show such skills, and that these skills were demonstrated in more detailed extensive responses and prosperous self-development (Apaydin and Hossary, 2017). However such findings also identified

significant gender differences, once more suggesting that whilst the role of the individual plays an avid part regarding development within a learning environment, a closer look at the individual's experience may reveal why such differences were apparent. Nevertheless, the notion of the personal perspective highlighting how such phenomena can impact an individual learner was still present.

From the literature it is apparent that there are elements relating to beyond the classroom itself, more focused on the ecology of the learner, indicating that consideration of a distributed systems approach may be required that requires both immediate and distal influences, as it seems more than one system may be contributing (Colthorpe et al., 2018).

Individual Experience and Wider Influences within Social Systems

The topic of metacognition has regularly been considered a necessary cognitive function in order to perform and engage with meaningful learning, but that in order to investigate such a processes fully consideration from both an individual and social perspective may be required (Garrison and Akyol, 2014). The transition from early individualistic models to the acknowledgement of metacognition as a socially situated and socially constructed phenomenon has been recent, therefore precipitating the study of metacognition within collaborative learning environments (Garrison and Akyol, 2015). Using an inquiry framework, research aimed at developing a construct for metacognition to be used amongst collaborative environments of learning argued that to better understand the underlying processes and dynamics of metacognitive ability, research may have to expand beyond previously explored individual approaches to learning and consider metacognition in terms of individual and shared regulation, within the learning environment as a whole. This once more highlights the importance of considering such learning techniques from both an individual and wider social system dynamic.

However, within a qualitative analysis of teachers' experiences alongside a detailed case-study narrative analysis of three teacher stories, research suggested that teachers' intuitive thinking prior to the integration of metacognitive strategies was incomplete, alongside their apparent scepticism of the strategies' effectiveness (Ben-David and Orion, 2013). However, after the teachers had mastered metacognitive strategies, they expressed amazement at how such an important and relevant issue had been almost invisible to them, possibly due to the complete lack of learning materials addressing such strategies and the absence of supportive in-classroom guidance. As such, educational facilitators expressed advancing professional development in such areas as an 'inseparable component' to their curriculum, thus highlighting the need for greater discussion around the possible broader 'barriers' to

learning, that emerge within both wider and immediate social systems, whether it be the education system or immediate classroom environments.

In addition, it has been argued that research on how metacognition can be facilitated and manifested in socially situated learning environments is limited (Garrison and Akyol, 2014). In this way, research approaching metacognition as the phenomenon of interest amongst student-led discussion, revealed that the metacognition was a useful construct when facilitated via student-led online discussions, however, also in order for students to use these skills effectively, guidance related to the co-construction of meaning, alongside instruction and motivation were in turn needed (Snyder and Dringus, 2014). From this it can again be argued that effective facilitation and in depth meaning from within an individual's wider contexts amongst social systems, in addition to insight from the individual's lived experience, is perhaps required for such notions to be enhanced. From this it is once more suggested that theorising is needed that considers chronological changes, such as learning changes over time, alongside one that accounts for system beyond the learner within a distributed approach (Garrison and Akyol, 2014).

Theoretical Framework

For consideration of a rich analysis, an alternate method would be to look at educational theories, such as Communities of Practice (Lave and Wenger, 1991), that suggest the notion that learning can be the reason a community comes together or is an intentional outcome of member's interactions. However, whilst these may argue that learning grows organically through informal social interactions and groupings, suggesting that friends are part of this community, such theories do not theorise about the connections between these communities, at both individual and remote levels (Carley, 2015). In addition, wider cultural expectations are not considered in such theories.

Alongside the notion of learning changing over time, emphasising the importance of theories that consider a rich analysis, an alternate way would be to look at other educational theories, such as Communities of Practice (Lave and Wenger, 1991),), that suggest the notion that learning can be the reason a community comes together or is an intentional outcome of member's interactions. However, whilst these may argue that learning grows organically through informal social interactions and groupings, suggesting that friends are part of this community, such theories do not theorise about the connections between these communities, at both individual and remote levels. In addition, wider cultural expectations are not considered in such theories in comparison to the Ecological framework (Bronfenbrenner, 1994) that

allows theorising of aspects that may not be necessarily learning communities, including the notion of chronological change.

As well as investigating the internal mechanisms of learning however, in an attempt to explore the individual situated within context and time, the current research will therefore also draw on Bronfenbrenner's Ecological framework (1994 for consideration of possible socio-cultural influences. Within this framework, Bronfenbrenner (1994) proposed that development and interaction is a continuous process that spans across an interlinked nest of systems within an individual's life. Ontologically speaking, this particular stance suggests that proximal interactions are the primary engines for such development, however that importantly the individual is placed at the center of a layer of systems in which a series of environmental variables, both immediate and distal, will ultimately impact the individual's development (illustrated below within Figure 1). The microsystem, closest to the individual, considers the role of the most immediate influences within an individual's daily life amongst their surrounding environment or social environments experienced regularly, such as school, family, friends, education, etc. Interactions between multiple components of the microsystem are represented by the mesosystem; in which various microsystems can form either connected or disconnected relationships or interactions depending on the quality (Bronfenbrenner, 1994). At a more distal level, the exosystem defines the larger social system that an individual does not function directly, such as the wider community and economy, e.g. local school welfare, family friends, mass media, etc. This then expands to the macro system consisting of elements such as cultural values, socioeconomic status, laws and norms, political policies and ideology, e.g. how education is applied, tested and improved via policy in England. Importantly, these systems may development over an individual's life, in which the chronosystem refers to the dimension of time, reflecting the transitions, trends and shifts one may experience in their lifetime and may explain how distinct changes may be seen even over a few years.

Whilst the original model may be argued to down play the characteristics of the individual and focus more on the context, alongside such models being mere representations of the real world and that researchers should acknowledge other experiences and knowledge alongside such frameworks, the model and social ecological perspective can be considered helpful for highlighting interrelationships (Rosa and Tudge, 2013). In this way the perspective may assist practitioners to recognise meaningful experience, as individuals are able to reflect their realities, world views and explanations of their difficulties, reminding them about the diversity and uniqueness of the human experience (Gill and Jack, 2007).

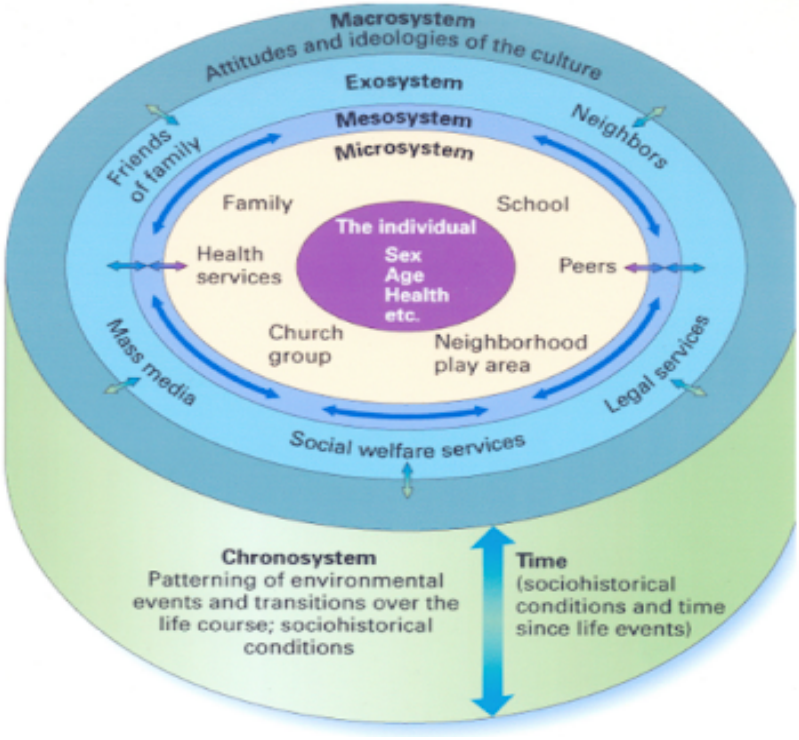


Figure 1. Visual diagram of Bronfenbrenner's Ecological Systems Theory.

The Mixed Methods Approach

The qualitative interview has often been disregarded as a method for interpreting affective phenomena, such as metacognition, however research does suggest that this method remains useful when addressing the distinct interpretations that individuals make of themselves and their experiences (McCormack, 2013). In this light research exploring the onset of metacognition, or metaemotions, via material and information gathering from interviewees via sound suggested that the identification of aspects within the daily lived experience usually unnoticed may be pivotal in portraying individuals once more as reactive beings, making meaning from their lives (Paiva, 2016). A viewpoint such as this, while possibly considered niche, demonstrates how different methodological techniques are required to truly capture the individual's experience, especially from within learning environments.

The present methodology therefore entails a mixed method approach, including both quantitative and qualitative data. This approach arguably focuses on collecting, analysing and interpreting both types of data to provide a better understanding of research problems than either approach could present alone, due to one data resource often not being sufficient to enhance a primary method or where initial

results need to be further explained, in which a second method is therefore needed (Creswell, 2013).

A major primary design within mixed method approaches that allows such research to be carried out is the convergent parallel design, aimed to provide a comprehensive analysis of the research problem by the collection of both forms of data, prioritizing the methods equally, keeping data analysis independent, and finally overall interpretation to look for convergences, contradictions or relationships of two data sources that is written into a discussion of the research (Bian, 2018). One challenge within this method is that researchers need to have strong basic knowledge to converge or to merge the data within a side -by side comparison (Creswell, 2013). Importantly however, a mixed method approach provides viable means for exploring the values and principles of a population, in conjunction with that which occurs at the community or individual level; a factor important when considering different metacognitive strategies amongst students, alongside consideration of these lived experiences and therefore influences from within an individual's immediate and larger environment. Therefore, for the purpose of this research, using a mixed method approach via a convergent parallel design takes the advantage of the opportunities afforded by mixing both quantitative and qualitative data, to increase the usefulness and application of findings (Razali et al., 2019).

Rationale

From a quantitative perspective, a large proportion of research was not carried out in westernized culture or directly applied to students and the academic work they complete in reality, for example being given problem-solving tasks as oppose to actual samples from field related material e.g. laboratory reports (Ku and Ho, 2010). As such the following study aims to address these issues and further explore the advantages of metacognition and how this can improve critical thinking ability for complex material. In addition it will also explore the relationship metacognition has with personal attributes, such as anxiety and effort, amongst university students. However, in light of the Coronavirus (COVID-19) pandemic, specific participants would later be identified in an ample opportunity to explore such learning experiences further. As such from a qualitative perspective, the present research will explore the essence of this lived experience in regards to how learning at university is perceived by such students. In addition, as an extension of previous findings, research will also aim to explore how wider social forces, drawing reference to the connection of social systems (Bronfenbrenner, 1994) specifically interact with the individual level, and contribute or influence on learning. In this way, the purpose for a combination of both quantitative and qualitative data within a mixed methods approach was prominent, as the quantitative findings resulted in the identification of

specific participants to explore their experiences further, adding further insight to the research from a different perspective.

Methodology

Overall Design

A mixed methods study employing both quantitative and qualitative methods of data collection, via questionnaires and semi-structured interviews. An overview of each method of data collection will follow. The study follows a convergent parallel design involving the simultaneous collection of qualitative and quantitative data followed by the combination and comparisons of these multiple data sources (see Figure 3).

The present research will therefore aim:

1. To examine how metacognitive strategies will vary for students with different levels of metacognitive ability, and how this depicts higher levels of critical thinking ability.

2. To explore how the university experience is perceived first hand by such students and to what elements therefore contribute or influence on learning.

Quantitative Methodology

Participants and Recruitment Method

The sample primarily consisted of undergraduate first and second year psychology students that were recruited via the online University of Huddersfield recruitment system; SONA. Participants were recruited via an opportunity sample and could either complete the question online or attend a session where they could fill out a hard copy voluntarily in exchange for university participation credit, required for their course. During the recruitment process exclusion criterion were individuals who had recently sought help for severe mental health issues in the last 6 months and who were likely to cause themselves harm or psychological discomfort by discussing slightly sensitive topics, such as self-worth, identity or anxiety. The participants were both male and female and ranged from ages 18-30 (see Table 1). Within this group nationality was varied to some extent. Prior to taking part all participants were asked to read a participant information sheet and sign a consent form that informed them of the requirement to provide their name, student number, year of study and brief information regarding previous study and level of

qualification. In addition they received an inclusion form, in order to be read and signed, that informed them of the slight risk of experiencing possible distress or discomfort. All forms had to be signed and understood in order for the participants to provide any data.

Table 1. Table listing number of participant's, age, gender, year of study and other exclusion criteria from the initial online questionnaire.

Number of participants	100+
Age	18+ Years (Undergraduates)
Gender	Mixed
Year of Study	1st and 2nd Year
Other details	Exclusion criteria: Individuals who are currently suffering with severe psychological difficulties and thus participation in this research would cause extreme psychological or emotional distress.

Materials

1. Metacognitive Awareness of Reading Strategies Inventory (MARSI) developed by Mokhtari and Reichard, (2002).

1.1 Apparatus

- Questions selected from the Metacognitive Awareness of Reading Strategies Inventory (MARSI) developed by Mokhtari and Reichard, (2002).
- Qualtrics, research questionnaire software used to present experiments for completion online.

Mokhtari and Reichard, (2002) collected psychometric data that demonstrated the instrument is valid and reliable measure for assessing student's metacognitive awareness while reading a piece of academic test. Cronbach's alpha was calculated for each grade and subscale level. Coefficients ranged from .89 to.93, and reliability for the total sample was .93, arguing a reasonably reliable measure of metacognitive awareness of reading strategies. Reliability for the total sample was .89. The research also argues promising evidence of construct validity via greater use of Global and Problem-Solving Strategies by those who rate themselves as good readers (Mokhtari and Reichard, 2002).

2. Critical Thinking Appraisal developed by Watson and Glaser, (1961).

2.1 Apparatus:

- Questions selected from the Watson-Glaser Critical Thinking Appraisal YN Form, (1961).
- Qualtrics, research questionnaire software used to present experiments for completion online.

The Watson Glaser Critical Thinking Appraisal was found to have adequate reliability over time (test-retest reliability) alongside the manual reporting adequate face, content, criterion and construct related validity evidence, (Hassan and Madhum, 2007). The reported reliability coefficients were found to be in agreement with those in the literature, supporting the test's internal consistency as the manual reports reliabilities in the range of 0.77 to 0.81 for the UK standardization sample, in addition to the manual indicating that the Total Watson Glaser Critical Thinking Appraisal is a more reliable score of critical thinking than the individual subscales (Rust, 2002).

3. State- Trait Anxiety Inventory (STAI) developed by Spielberger et al., (1983).

3.1 Apparatus:

- Questions from the State/ Trait Anxiety Inventory (STAI), (1983).
- Qualtrics, research questionnaire software used to present experiments for completion online.

For the State- Trait Anxiety Inventory, internal consistency coefficients for the scale were reported to have ranged from .86 to .95; and test-retest reliability coefficients have ranged from .65 to .75 over a 2-month interval (Spielberger et al., 1983). However, as states of anxiety may be transitory, measures of internal consistency (such as the alpha coefficient) were found to provide a more meaningful index of the reliability of S-Anxiety scales than test-retest correlations. The alpha coefficients for the S-Anxiety and T-Anxiety scales were reported at above .90, alongside individual items needing to meet validity criteria at each stage of the test development process in order to be retained of further evaluation and validation, support the argument of considerable evidence being present attesting to the construct and concurrent validity of the scale.

4. Rating Scale of Mental Effort (RSME) developed by Ziljstra (1993).

4.1 Apparatus:

- Rating Scale of Mental Effort (RSME), Ziljstra (1993).

- Qualtrics, research questionnaire software used to present experiments for completion online.

As Cronbach's Alpha measures the internal consistency of the items of a multi-dimensional instrument, Ziljstra's (1993) Rating Scale Mental Effort was reported to not be subject to reliability analysis as it is uni-dimensional (Longo, 2018). It is reported that a positive moderate correlation is expected for both convergent validity and face validity, suggesting a reasonable relationship of mental workload measures (Ziljstra's, 1993).

Procedure

For the first stage of the study, a combination of online and in-person, paper versions of the questionnaires were provided for participates to either sign up and complete online, using the Qualtrics and SONA recruitment software, or attend a session where they could complete a paper copy. Both questionnaires had the exact same structure, format and content in which questions derived from the Metacognitive Awareness of Reading Strategies Inventory (MARSI); developed by Mokhtari and Reichard (2002), Critical Thinking Appraisal; developed by Watson and Glaser's (1961), State- Trait Anxiety Inventory (STAI); developed by via Spielberger et al., (1983), and Rating Scale of Mental Effort (RSME); developed by Ziljstra's (1993). Online participants were presented with brief information regarding the study (see Appendix Q) before being asked to complete the online consent form (see Appendix N). If participants responded 'no' to any of the consent statements they were immediately redirected away from the questionnaire and their response was deleted. However, if they consented to all of the statements they would be redirected to the start of the questionnaire and were prompted to move on through each section using Qualtrics software. At the end of the study, responses were recorded automatically and the participants received their university participation credit.

Similarly, participants that booked a session to complete a paper copy were allotted a time, date and location to do so. These sessions were completed within quiet interview rooms complete with desk space, within the psychology laboratory department at the University of Huddersfield. Upon arrival participants were greeted and asked to read the participant information sheet, consent and inclusion forms before beginning (See Appendices J, K and L). If they consented, participants were given a brief explanation regarding the study and were left to complete the questionnaire using their own judgment. When completed, participants were thanked for their time, granted their participation credit, and were given a debrief sheet including contact details and an exhaustive list of any relevant support should

they feel they need it (See Appendix M). The questionnaire was left to run online until over 100 students had completed it (approximately 5-8 weeks). The data was then analyzed from online and paper copy questionnaires that helped to identify level of metacognitive ability and critical thinking patterns, specifically for which students scored the highest 10% and lowest 10% on metacognitive ability.

Four students that had each produced a variety of scores (i.e. the highest and lowest) were then asked if they would attend a further session in which a short comprehension task would be given to complete that reflected an actual undergraduate assessment (e.g. a laboratory report). In this follow up session the participants would be asked to complete the task whilst communicating thought processes and thinking patterns aloud via verbal protocols, following Erricson and Simon's (1993) verbal protocol method. A discussion around the participant's self worth, anxiety, effort and academic identity, in the form of a semi-structured interview would have then followed.

However, due to the Coronavirus (COVID-19) pandemic and disrupted academic timetable, the second stage of the study had to be adjusted. In addition, as previously stated, as the four students were selected to specifically explore the differences between measures for the different students, an ample opportunity to explore the experiences of the four individual students was presented. Interest was then developed to consider that, despite the quantitative findings and scores, what does this mean to the individual, or suggest about their person? What traits does this coincide with if any? How has it shaped their experience? How is this useful and what can we take away from it? In this way, the purpose for a combination of both quantitative and qualitative methods was prominent, as the quantitative findings resulted in the identification of specific participants to explore their experiences further, which in turn gave in depth insight to the research from a different perspective.

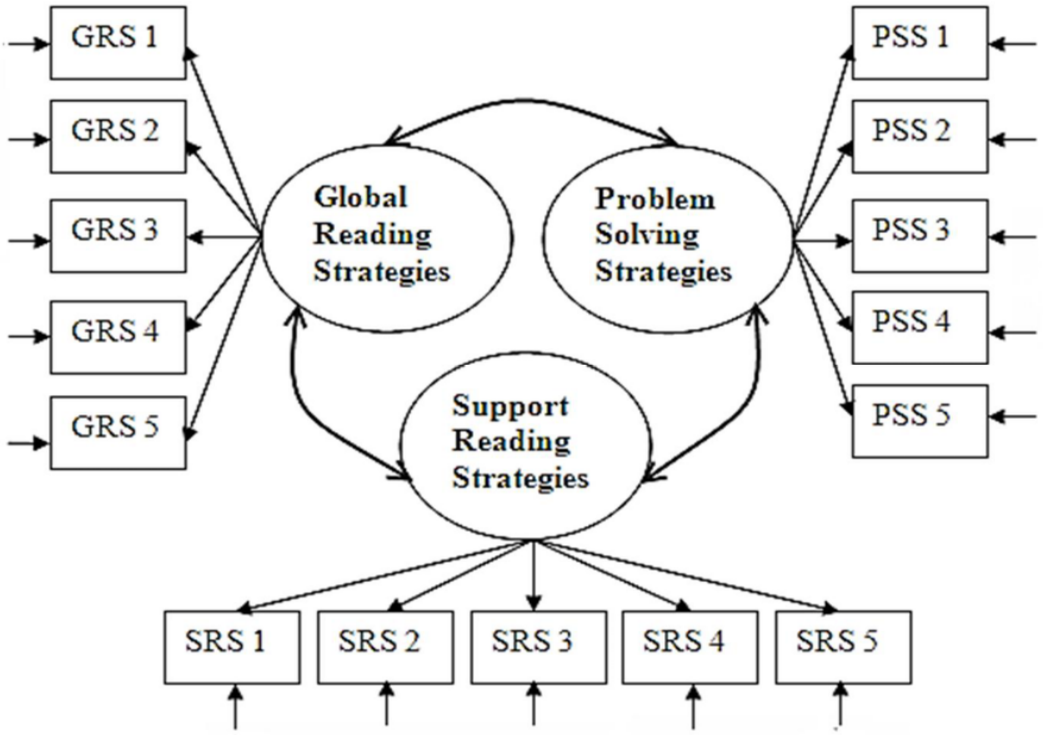
Data collection

Measure of Metacognitive Ability

Metacognitive Awareness of Reading Strategies Inventory (MARSI) developed by Mokhtari and Reichard, (2002).

The Metacognitive Awareness of Reading Strategies Inventory (MARSI) refers to a measure of students' self-assessments in regards to how well they utilise reading strategies (e.g. use of school- based texts) when working within an academic environment (Mokhtari et al., 2018), (see Appendix C). Designed to encourage

students to further utilise metacognition in order to be more tactical and active in their approach to reading, the measure is a self-reported analysis of reading behaviours students may use and entails three main subscale categories: Global Reading Strategy (i.e. setting purpose for reading, previewing text content and predicting what the text is about when analysing a piece of academic text), Problem Solving Strategy (i.e. repair strategies that are used when text becomes difficult to read), and Support Strategy (i.e. providing support mechanisms aimed at sustaining responsiveness to reading, such as dictionaries and other support systems); an example of this is illustrated in Figure 2.



Note: GRS = global reading strategies, PSS = problem-solving strategies, SRS = support reading strategies

Figure 2. MARSI-R scale relying on three interconnected reading strategy categories: the Global Reading Strategies (GRS), the Problem-Solving Strategies (PSS), and the Support Reading Strategies (SRS).

Following this, each of those categories gets five items rated between 1 and 5 based on short prompts (e.g. 1. I have never heard of this strategy before; 2. I have heard of this strategy, but I don't know what it means; 3. I have heard of this strategy, and I think I know what it means; 4. I know this strategy, and I can explain how and when to use it; 5. I know this strategy quite well, and I often use it when I read.) Table 2.

shows a breakdown of each item, following which scores are calculated to produce an average for each category and the overall MARSI-R score.

Table 2. Description of the items associated with three latent factors under MARSI-R.

Factor/Item	Description
Global reading strategies (GRS)	
GRS 1: Having a purpose in mind when reading	
GRS 2: Previewing text to see what it is about before reading	
GRS 3: Checking to see if the content of the text fits my purpose for reading	
GRS 4: Using typographical aids like bold face and italics to pick out key information	
GRS 5: Critically analyzing and evaluating the information read	
Problem-solving strategies (PSS)	
PSS 1: Getting back on track when getting sidetracked or distracted	
PSS 2: Adjusting my reading pace or speed based on what I'm reading	
PSS 3: Stopping from time to time to think about what I'm reading	
PSS 4: Re-reading to help ensure I understand what I'm reading	
PSS 5: Guessing the meaning of unknown words or phrases	
Support reading strategies (SRS)	
SRS 1: Taking notes while reading	
SRS 2: Reading aloud to help me understand what I'm reading	
SRS 3: Discussing what I read with others to check my understanding	
SRS 4: Underlining or circling important information in text	
SRS 5: Using reference materials such as dictionaries to support my reading	

It is worth noting that the Metacognitive Awareness of Reading Strategies Inventory (MARSI) is not an accurate measure of actual reading strategy usage, as it assesses only what reading strategies the individuals believe they are using, resulting in it being a self-reported measure (Dunoyer, 2018). However, full potential of the measure can also be achieved by taking repeated measurements throughout a term, year, or a degree if needed, effectively assessing a student's progression toward efficient reading skills. The measure is therefore useful for individuals to get a baseline measure for reflection and growth of their own reading skills (Mokhtari et al., 2018).

Measure of Critical Thinking

Critical Thinking Appraisal developed by Watson and Glaser, (1961).

The Watson-Glaser Critical Thinking Appraisal refers to 80 reading passages that present problems, statements, arguments, and interpretations, each requiring the application of analytic reasoning skills. It is a common test of critical thinking, requiring individuals to possess understanding from multiple perspectives and the ability to reason with fact, versus assumption. The task requires participants to complete five subtests, designed to measure an individual's ability to reason

analytically and logically. The full form consisted of 100 questions spread across each sub-test, however due to time constraints and the inappropriate nature of some questions due to the age of the questionnaire, i.e. appears dated, for the purpose of this study the questionnaire was shortened featuring multiple choice questions (see Appendix A). Individuals are asked to complete this measure completing the five exercises: Drawing Inferences, Recognizing Assumptions, Argument Evaluation, Deductive Reasoning, and Logical Interpretation, as shown in Table 3. Scores were calculated based on the total number of correct answers provided, with higher scores indicating better performance.

Table 3. Description of the 'Five Subtests' as described by Watson and Glaser (1961), within the form manual.

1. Inference:	"Samples ability to discriminate among degrees of truth or falsity of inferences drawn form a given statement".
2. Recognition of Assumptions	"Samples ability to recognise unstated assumptions or presuppositions which are taken for granted in given statements or assertions".
3. Deduction:	"Samples ability to reason deductively from given statements or premises; to recognise the relation of implication between propositions; to determine whether what may seem to be an implication or a necessary inference from given premises is indeed such".
4. Interpretation:	"Samples ability to weigh evidence and to distinguish between (a) generalisations from given data that are not warranted beyond a reasonable doubt, and (b) generalisations which, although not absolutely certain or necessary, do seem to be warranted beyond a reasonable doubt".
5. Evaluation of Arguments:	"Samples ability to distinguish between arguments which are strong and relevant and those which are weak or irrelevant to a particular question at issue".

In addition, whilst the Watson-Glaser Critical Thinking Appraisal is intended to measure an individual's ability to identify assumptions needed to support a statement, it has been suggested that constructing fixed- response tests of critical thinking can be difficult. Kennedy et al., (1991) argues that a major difficulty in defending an individual's answer is that different test takers bring different background beliefs to the measure. Therefore, caution should be exercised when

considering if a response is 'correct or incorrect' as it may depend on the reasons for the choice. However, with over 85 years' worth of development, the Watson-Glaser Critical Thinking Appraisal is arguably the most popular measure of critical thinking ability.

Measure of State and Trait Anxiety

State- Trait Anxiety Inventory (STAI) developed by Spielberger et al., (1983).

The State-Trait Anxiety Inventory (STAI) refers to a common self-reported measure of trait and state anxiety, often used in research as an indicator of distress. Consisting of 40 items, it is scored by a likert-scale in which 20 items are allocated to each of the S-Anxiety and T-Anxiety subscales. State anxiety regards severity and feelings of anxiety present at the time of measurement and is designed to measure subjective feelings, such as nervousness, tension, worry, apprehension etc., (Greene et al., 2017). State anxiety items include: "I am tense; I am worried" and "I feel calm; I feel secure" (see Appendix B). Trait anxiety regards an individual's general 'proneness' to be anxious, perhaps even an aspect of personality, and is designed to measure subjective feelings of confidence, security, calmness, etc., (Greene et al., 2017). Trait anxiety items include: "I worry too much over something that really doesn't matter" and "I am content; I am a steady person" (see Appendix B). All items are rated on a 4-point scale (e.g., from "Not at All" to "Very Much So") in which higher scores indicate greater levels of anxiety.

The State- Trait Anxiety Inventory (STAI) is among the most widely researched and used measures of general anxiety, however research has questioned the validity of the scale in terms of the T-Anxiety subscale being able to differentiate anxious from depressed states (Julian, 2011). Despite this however, studies have shown that it is a sensitive predictor of distress over time, but can vary with changes in support systems, health, and other individual characteristics (Elliott et al., 2001).

Measure of Effort

Rating Scale of Mental Effort (RSME) developed by Ziljstra (1993).

The Rating Scale Mental Effort (RSME) refers to a vertical axis scale ranging from 0 to 150, used to measure subjective mental workload. The measure consists of a vertical line with a length of 150 mm marked with anchor points, each accompanied by a descriptive label indicating a degree of effort (see Appendix D). It offers nine anchor points reflecting different subjective descriptive representations of effort ranging from "Absolutely No effort" to "Extreme Effort" (Waard, 1996). Individuals are asked to score how much effort they believe they reflect in a given scenario, in the case of

this study individuals were asked to score how much effort they put in to the previous measures and questionnaires, by marking a line on the scale. Scores higher up on the scale indicate that more effort was exercised. The Rating Scale Mental Effort (RSME) has been widely used in Western culture, however when translated the scale has shown to be relatively insensitive to changes in mental effort resulting in the question of whether the insensitivity is related to national culture or to the translation of the scale (Widyanti et al., 2013). However the scale remains easy to implement as a measure, and is a valid mental-workload instrument.

Design

For the first part, and quantitative section, of the study this research used a repeated measures design in which all participants completed the same task. The independent variable was metacognitive ability, investigated over three subscale categories of the Metacognitive Awareness of Reading Strategies Inventory (MARSI); developed by Mokhtari and Reichard (2002), which were as follows: Global Reading Strategies (GLOB Subscale), Problem- Solving Strategies (PROB Subscale) and Support Reading Strategies (SUP Subscale). There were then four dependent variables: Critical Thinking score, via Watson and Glaser's (1961) Critical Thinking Appraisal, State Anxiety score and Trait Anxiety score, via Spielberger et al's., (1983) State- Trait Anxiety Inventory (STAI), and Effort score, via by Ziljstra's (1993) Rating Scale of Mental Effort (RSME). It is worth noting that the above measures of state anxiety, trait anxiety and effort were intended to be sub-components and to act as additional data to further support or add to findings. It was therefore hypothesised that critical thinking ability would be directly affected by the independent variable.

Methods of Analysis

As stated below, a one-way between groups analysis of variance (ANOVA) was the method of analysis conducted to explore the effect of the independent variable (i.e. metacognitive ability) over three levels, i.e. the subscale categories of the Metacognitive Awareness of Reading Strategies Inventory (MARSI); Mokhtari and Reichard (2002), Global Reading Strategies (GLOB Subscale), Problem- Solving Strategies (PROB Subscale) and Support Reading Strategies (SUP Subscale), on the dependent variables (i.e. critical thinking score, state anxiety score, trait anxiety score and effort score) across low, medium and high ability groups. For the analysis, a tertile split was conducted at the 33rd and 66th percentiles for each reading strategy group when analysing a piece of academic text, resulting in a Low, Medium and High group for the metacognitive reading strategies of the MARSI (i.e. Global Reading, Problem Solving and Support Strategy), and ensured that the three groups represented distinct categories.

Tertile splits have been used commonly and have been appropriate when used in the examining differences in elements such as working memory and executive function differences for verbal reasoning tasks (Alloway et al., 2010). For example, the relationship between higher levels of metacognitive reading strategies and higher critical thinking abilities has been portrayed within the literature (Kuhn & Dean, 2004). In addition, research has established the successful existence of distinct categories from a tertile split, for example when evaluating executive functioning, allowing this research to build on such past procedures and provides justification for the use of a tertile split within the metacognitive reading strategy groups (Hill et al., 2012). As past research has employed ANOVA or tests for different groups, the current experiment has therefore employed past procedures from research that had split the sample into low, medium, and high working memory capacity groups for verbal comprehension tasks (Richmond et al., 2016), coinciding with the present method. The ANOVA is a good analysis of variance or choice of test to use as it determines if a significant difference is present between two or more variables and can be used to analyse situations in which independent variables have more than two levels, providing that all assumptions are met (Cohen, 1988). An overview of the six assumptions to consider when using a one-way ANOVA is outlined in Table 4.

Table 4. The six assumptions for a one-way ANOVA (Analysis of Variance), (Cohen, 1988).

Assumption #1	You have a continuous dependent variable.
Assumption #2	Your independent variable is categorical with two or more independent groups.
Assumption #3	You have independence of observations.
Assumption #4	There should be no significant outliers in the groups of your independent variable in terms of the dependent variable.
Assumption #5	Your dependent variable should be approximately normally distributed for each group of the independent variable.
Assumption #6	You have homogeneity of variances (i.e., the variance is equal in each group of your independent variable (i.e. greater than 0.5).

Qualitative Methodology

Participants and Recruitment Method

Following on from this, 10 students (5 from both the highest and lowest scorers of metacognitive ability) were approached by email to attend a further session. From this 4 students responded and were specifically selected to explore the differences between high and low rated metacognitive ability and how this may have influenced the individual's experiences. Within a voluntary sample, the participants completed a semi-structured interview either in person or via pre-recorded audio file transfers due to COVID-19. On agreement the participants were given a further consent and inclusion form to read and sign on similar grounds. They were informed that their student number would be randomly coded to a participant number to keep their identity confidential. Information regarding these participants is displayed in the table below (Table 5).

Table 5. Table listing the participant's pseudonyms, age, gender and year of study.

Participants	Pseudonyms	Age	Gender	Year of Study
Participant 1	Blake	18	Male	1
Participant 2	Lee	20	Male	1
Participant 3	Samantha	27	Female	2
Participant 4	Dakota	54	Female	1

Procedure

It should be noted that due to COVID-19 restrictions, the semi-structured interviews were initially carried out in person, however they then had to be completed via pre-recorded audio file transfers. For the in person sessions, participants were firstly reminded about their right to withdraw and the audio recorder was then started. The participants were then interviewed around the topic of experiencing learning at university and relevant factors, i.e. identity at university, effort levels, and perception of success, motivation, and barriers to learning etc., (see interview schedule in Appendices P and R). If participants completed the task in their own time, they were sent a consent form, inclusion form and copy of the interview questions (see Appendices N, L and R). They were then asked to record their voice

on a phone or computer as they read and contemplated each question, as they would do in a normal interview. They were asked to read each question aloud, or it's number, before beginning answering. On completion, the participants were thanked and provided with a debrief sheet that included a list of relevant helplines (see Appendix O). A total of four interviews were conducted, all varying in length, and ranged between 30 and 90 minutes.

Data collection

Qualitative data was collected via semi-structured interviews. Due to COVID-19 restrictions, the semi-structured interviews were initially carried out in person but were then completed in the participant's own time, via voice recorded audio file transfers.

Interviews

Interview questions were developed around such topics that appeared intriguing when considering an individual's first hand experience of university based on previous research that examined contributory factors and possible influences on university students. For example, research exploring students' learner identities and the relation to their background and subject choice found that half of the students identified as having positive learner identities, in which they may have chosen a degree subject allied to a specific career and therefore may have a more deliberate approach to learning (Lawson, 2014). Additionally, Reay et al., (2009) suggested that students from non-traditional entry routes were 'relatively unprepared for the university experience' presenting the notion that identity may be stronger depending on where a student lived e.g. at home, on campus or in university accommodation. Alternatively, research examining other internal states suggested that only when a student achieves good grades or displays academic competence then they will feel a sense of self-worth, therefore questions about self-worth were based on several scales including general non-specific questions as well as those regarding academic performance (Crocker et al., 2003). For a full overview, a complete version of the interview schedule can be found in both Appendices P and R.

Materials:

- A standard voice recorder used to tape the participant's responses.
- Interview questions were devised and modified from previous psychological research as outlined above.

Design

For the second part, and qualitative section of the study, semi-structured interviews were employed to capture the individual's own experiences.

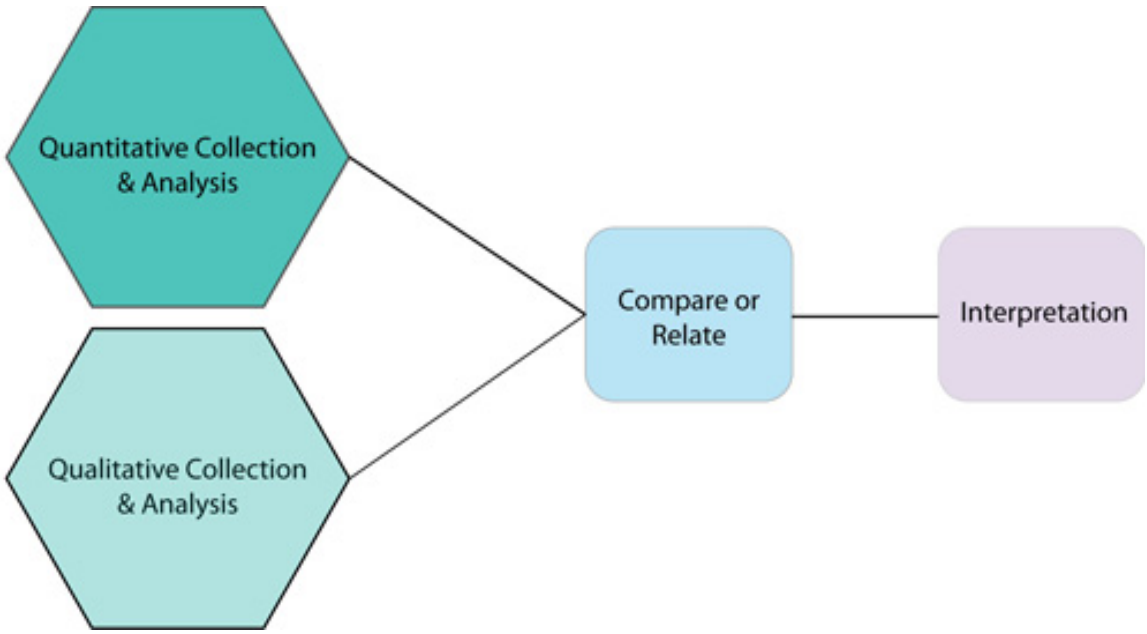


Figure 3. Example of a Convergent Parallel Design layout.

Ontological and Epistemological Discussion

It is worth noting that this study took place during the effects of the Coronavirus (COVID-19) pandemic and therefore adjustments had to be made to the project where appropriate, particularly in the second stage of the study.

The aims of this project were therefore considered from a partially distributed ontology and epistemological viewpoint. The project firstly set out to establish if greater ability of metacognitive reading strategies resulted in greater levels of competency in critical reasoning of text. Findings from this outlook therefore presented one type of trend, and in this way data drew upon scientific inquiry that relied on measurable data regarding a particular population; in this case undergraduate students (Allen, 2017). This reflects the aim of how metacognitive strategies vary for students in regards to the frequency of a specific phenomenon, e.g. metacognitive ability. However, as we cannot separate or measure these elements, e.g. learning, away from the social and cultural world that they inhabit, data was also then considered from a socio-cultural context via qualitative methods. This was on the premise that how the individual experiences such learning, and their

subsequent learning styles or methods, will be contextualized by who they are and wider influences.

It followed the notion that to further understanding in this area, one must go one step further and consider influences from an individual's immediate environment, but also the interaction of the larger environment also, to consider how human development is influenced and that this may exist within different types of environmental systems (Bronfenbrenner, 1994). This particular viewpoint considers the aim of understanding how university is experienced and perceived first hand by students. However, whilst such factors are of importance, caution was exercised not to dispute the active role of the individual in their own experience. Importantly it is the active individual that is at the centre of such systems and therefore highlights the importance of considering the wider context and the individual's own biology and characteristics (Ashiabi et al., 2015). The complexity of the latter therefore highlights why a mixed method approach and dual viewpoint was carried out in order to truly capture the experience and contributing factors for the learner during university, beyond the phenomena of metacognitive ability and various strategies.

Methods of Analysis

For the qualitative part of the study, a thematic analysis was conducted in which interview transcripts were firstly transcribed, after which aspects of Braun and Clarke's (2006) hierarchical six-step method of thematic analysis were applied. In order to get an overview, the first step of this analysis required familiarizing myself with the data of my interview by reading the transcripts multiple times, after which initial and descriptive codes were generated (Nowell et al., 2017). From this initial themes were then generated and reviewed, within a thematic framework, until two or three main themes emerged that could be named and wrote up. It is important to note that this method was firstly chosen as interpretations regarding the data are arguably limitless, demonstrating flexibility in identifying themes, and therefore a rich and in depth analysis is often provided (Braun and Clarke, 2006). Furthermore, Braun and Clarke (2006) argue there is a substantial lack of literature surrounding thematic analysis in comparison compared to other qualitative methods, such as ethnography, grounded theory and phenomenology, causing some researchers to feel uncertain how to carry out a rigorous analysis. However, as qualitative research is intended to collate knowledge grounded in human experience, it is imperative for a method manner to produce meaningful and useful findings and in this way thematic analysis can be considered useful for summarizing key features of a large amount of data and forces the researcher to take a well-structured approach (King, 2004). In this way it's simplicity may be seen as an advantage (see Appendix G).

In a similar light, to address how the individual's experience was influenced and data informed from a socio-cultural perspective, data was also analyzed using an underlying framework of Ecological Systems Theory (Bronfenbrenner, 1994). Thematic analysis is presented as a useful method for the examining of different perspectives from individuals, highlighting similarities and differences, and gathering unanticipated insights from these elements as a result (Nowell et al., 2017). However in order to further expand on this notion, the breadth of frameworks such as the Ecological Systems Theory (Bronfenbrenner, 1994) allows for the illustration of how the human experience is influenced, through mutual influences and simultaneous relationships within and between the individual's different systems or environments, including the learning environment and thus allows the aims of this project to be fully considered (Bronfenbrenner, 1979). Importantly within this model, the role and importance of the individual at the centre of all social systems is not denied, however it is argued that in order to consider the complexity of human behaviour, in addition, one must pay attention to the entire ecological system and the socio-cultural context that centers around the individual (Bronfenbrenner, 1994).

Ethical Precautions

Participants in this study involved addressing slightly sensitive topics, for example anxiety, self-worth and identity. As a result, exclusion criterion was clearly stated in the inclusion form (see Appendix L) excluding anyone who had recently sought treatment for mental health issues (in the last 6 months) and that was likely to cause discomfort or distress to themselves by addressing such issues. All participants were given ample time to read the participation information sheet prior to both parts of this study (if completion was carried out online participants were sent such documents via email) and were asked to fill out a consent form and inclusion form in order to take part in the study, clearly stating the possibility of slight distress or discomfort (see Appendix K and L). Individuals who attended the second session were asked to fill out an additional consent and inclusion form repeating this information and were consistently reminded they could leave the session without excuse at any time. Following this, all participants in this study were given a debrief sheet containing information regarding the experiment and a comprehensive list of relevant contacts should they need to seek further help (see Appendix M). Individuals who took part in the second part, or qualitative part) of the study were given a unique participant number coded from their university student number in order to keep their identity confidential throughout the study. This number was used consistently throughout analysis, before being assigned a pseudonym in order to discuss participants individually without disclosing their identity. In addition, this research was reviewed and granted full ethical approval by the University of Huddersfield, Division of Psychology, before any data was collected.

Results

For the purpose of this analysis it is worth nothing that the findings are collected from both the examination of quantitative data and exploration of qualitative transcripts. In this light, results and findings from a quantitative outlook are firstly presented followed by three overarching themes that derived from qualitative exploration of the experiences of four individual students, all with varying levels of metacognitive ability. Importantly whilst the data collected from both sides as shown here appeared to be supportive of each the other, in other areas a contradictory argument presented itself. A further exploration of the comparisons between the two methodologies will follow thereafter.

Quantitative Data

It is important to note that for the quantitative data, whilst not the expected analysis choice, an ANOVA was performed primarily as differences between metacognitive ability groups were a specific point of interest within the research. Using this method of analysis created an independent variable within an experimental design and allowed the research to determine if differences in mean values between the groups were formed by chance or if they were significantly different. If data were not split in to groups, a regression method of analysis would have been appropriate. The effects of significant differences between high, medium and low groups therefore acted as interesting comparison points.

Global Reading Strategy

A one-way between groups analysis of variance (ANOVA) was conducted to explore the effect of metacognitive ability (IV) on the four dependent variables: Critical Thinking score, (Watson and Glaser, 1961), State Anxiety and Trait Anxiety score, (Spielberger et al's., 1983), and Effort score, (Ziljstra's, 1993) across low, medium and high ability groups when using the 'Global Reading Strategy' in the MARSI (The Metacognitive Awareness of Reading Strategies Inventory). Participants were divided into three groups in accordance to how much the 'Global Reading Strategy' was used (e.g. setting purpose for reading, previewing text content and predicting what the text is about) when analysing a piece of academic text. These groups were low, medium and high. The ANOVA's for each variable are reported in Table 7. The descriptive statistics associated with the dependent variables across the three metacognitive ability groups for the 'Global Reading Strategy' are reported in Table 6.

Table 6. *Descriptive Statistics for Critical Thinking, State Anxiety, Trait Anxiety and Effort scores across the Low, Medium and High Metacognitive Ability Groups for the 'Global Reading Strategy' of the MARSI*

Global Reading Strategy				
DV	Global Reading Strategy Ability Group	*N*	Mean Scores *M*	*SD*
Critical Thinking	Low	36	49.58	9.86
	Medium	36	51.27	7.98
	High	36	54.25	8.90
State Anxiety	Low	36	44.14	6.55
	Medium	36	43.39	5.72
	High	36	45.75	6.50
Trait Anxiety	Low	36	48.28	7.13
	Medium	36	42.92	6.99
	High	36	47.56	5.20
Effort	Low	36	66.72	27.08
	Medium	36	77.11	21.50
	High	36	86.17	20.74

Table 7. *One-Way Analysis of Variance of metacognitive ability on critical thinking scores, state anxiety, trait anxiety and effort when using the 'Global Reading Strategy' of the MARSI*

DV	Source	*df*	*SS*	*MS*	*F*	*p*
Critical Thinking	Between Groups	2	401.79	200.89	2.50	0.08
	Within Groups	105	8410.72	80.102		
	Total	107	8812.51			
State Anxiety	Between Groups	2	104.79	52.39	1.33	0.26
	Within Groups	105	4131.61	39.34		
	Total	107	4236.40			
Trait	Between Groups	2	609.38	304.69	7.19	0.001

Anxiety	Within Groups	105	4444.86	42.33		
	Total	107	5054.25			
Effort	Between Groups	2	6816.22	3408.11	6.28	0.003
	Within Groups	105	56927.77	542.16		
	Total	107	63744.00			

1.1 Critical thinking

For critical thinking ability, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 0.47, *p*=0.62. The Levene's of equality of variance was non significant (P>0.05) for critical thinking scores, indicating equality of variance between the low, medium and high metacognitive ability groups. However, the ANOVA revealed that there was no significant difference in critical thinking scores for the three groups, F (2, 105) = 2.50, *p*=.086, thus the null hypothesis of no differences between the means could not be rejected. These results suggest that there was no substantial relationship between critical thinking ability and level of metacognitive ability, by use of the 'Global Reading Strategy' strategy of the MARSI, highlighting that when called upon for specific strategies certain individual skills, such as the ability to critically think, may not facilitate overall level of metacognitive ability.

1.2 State Anxiety

For state anxiety, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 0.20, *p*=0.81. The Levene's of equality of variance was non significant (P>0.05) for levels of state anxiety, indicating equality of variance between the low, medium and high metacognitive ability groups. However, the ANOVA revealed that there was no significant difference in levels of state anxiety across the three groups, F (2, 105) = 1.33, *p*=.26, thus the null hypothesis of no differences between the means could not be rejected. These results suggest that there was no relationship between levels of state anxiety within an individual and level of metacognitive ability when using the 'Global Reading Strategy' of the MARSI. This highlights the possibility that metacognition may not be affected by individual characteristics such as state anxiety (anxiety that is triggered in situational environments or when exposed to anxiety provoking stimuli) when using this particular reading strategy to analyse and understand text (e.g. the 'Global Reading Strategy').

1.3. Trait Anxiety

For trait anxiety, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 2.80, *p*=0.06. The Levene's of equality of variance was non significant (P>0.05) for levels of trait anxiety, indicating equality of variance between the low, medium and high metacognitive ability groups. The ANOVA revealed that there was a significant difference in levels of trait anxiety for the three groups, F (2, 105) = 7.19, *p*<.01, thus the null hypothesis of no differences between the means was rejected. The actual difference in mean scores between groups was considered medium to large; the effect size, calculated using eta squared being 0.12 (Cohen, 1988).

To evaluate the nature of the differences between the three groups further, post-hoc comparisons using the Least Significant Difference (LSD) test were used. Results indicated that the mean score for the medium metacognitive ability group (M= 42.92, SD= 6.99) was significantly different (*p*<.01) from the low metacognitive ability group (M= 48.28, SD= 7.13). In addition, the medium metacognitive ability group (M= 42.92, SD= 6.99) was also seen to be significantly different (*p*<.01) from the high metacognitive ability group (M= 47.56, SD= 5.20). There was no statistically significant difference in mean scores between the low and high group.

These results would suggest that lower levels of metacognitive ability coincide with higher levels of trait anxiety (anxiety that is considered a trait of personality within describing individual differences) when using the 'Global Reading Strategy' of the MARSI, as the low metacognitive ability group (M= 48.28, SD= 7.13) had a higher mean level of trait anxiety present in comparison with the medium metacognitive ability group (M= 42.92, SD= 6.99). Furthermore results also suggest that medium levels of metacognitive ability actually showed a lower mean level of trait anxiety (M= 42.92, SD= 6.99) than the high metacognitive ability group (M= 47.56, SD= 5.20). Overall the group that can be seen to produce the highest mean level of trait anxiety was the low metacognitive ability group (M= 48.28, SD= 7.13).

1.4 Effort

For level of effort, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 2.06, *p*=0.13 The Levene's of equality of variance was non significant (P>0.05) for levels of effort, indicating equality of variance between the low, medium and high metacognitive ability groups. The ANOVA revealed that there was a significant difference in levels of effort for the three groups, F (2, 105) = 6.28, *p*<.01, thus the null hypothesis of no differences between the means was rejected. The actual difference in mean scores

between groups was considered medium to large; the effect size, calculated using eta squared being 0.11 (Cohen, 1988).

To evaluate the nature of the differences between the three groups further, post-hoc comparisons using the Least Significant Difference (LSD) test were used. Results indicated that the mean score for the low metacognitive ability group (M= 66.72, SD= 27.08) was significantly different (p<.01) from the high metacognitive ability group (M= 86.17, SD= 20.74). The low metacognitive ability group (M= 66.72, SD= 27.08) did not reach significant difference (p=0.061) from the medium metacognitive ability group (M= 77.11, SD= 21.50). There was also no statistically significant difference in mean scores between the medium and high group.

These results suggest that greater levels of metacognitive ability, by use of the 'Global Reading Strategy' of the MARSI, facilitates higher levels of effort being put in by the individual as the high metacognitive ability group had a higher mean level of effort (M= 86.17, SD= 20.74) in comparison with the low metacognitive ability group (M= 66.72, SD= 27.08).

Problem Solving Strategy

A second, one-way between groups analysis of variance (ANOVA), was conducted to explore the effect of metacognitive ability (IV) on the four dependent variables: Critical Thinking score, (Watson and Glaser, 1961), State Anxiety and Trait Anxiety score, (Spielberger et al's., 1983), and Effort score, (Ziljstra's, 1993) across low, medium and high ability groups when using the 'Problem Strategy' in the MARSI (The Metacognitive Awareness of Reading Strategies Inventory). Participants were divided into three groups in accordance to how much the 'Problem Solving Strategy' was used (e.g. repair strategies that are used when text becomes difficult to read) when analysing a piece of academic text. These groups were low, medium and high. The ANOVA's for each variable are reported in Table 9. The descriptive statistics associated with the dependent variables across the three metacognitive ability groups for the 'Problem Solving Strategy' are reported in Table 8.

Table 8. *Descriptive Statistics for Critical Thinking, State Anxiety, Trait Anxiety and Effort scores across the Low, Medium and High Metacognitive Ability Groups for the 'Problem Solving Strategy' of the MARSI*

	Problem Solving Strategy			
DV	Problem Solving Strategy Ability	*N*	Mean Scores *M*	*SD*

	Group			
Critical Thinking	Low	36	48.50	8.57
	Medium	36	52.66	8.62
	High	36	53.94	9.34
State Anxiety	Low	36	43.58	6.37
	Medium	36	43.17	6.24
	High	36	46.53	5.88
Trait Anxiety	Low	36	47.14	8.06
	Medium	36	44.58	7.07
	High	36	47.03	5.01
Effort	Low	36	65.19	27.94
	Medium	36	81.69	19.96
	High	36	83.11	20.92

Table 9. *One-Way Analysis of Variance of metacognitive ability on critical thinking scores, state anxiety, trait anxiety and effort when using the 'Problem Solving Strategy' of the MARSI*

DV	Source	*df*	*SS*	*MS*	*F*	*p*
Critical Thinking	Between Groups	2	583.63	291.81	3.72	0.02
	Within Groups	105	8228.88	78.37		
	Total	107	8812.51			
State Anxiety	Between Groups	2	241.68	120.84	3.17	0.04
	Within Groups	105	3994.72	38.04		
	Total	107	4236.40			
Trait Anxiety	Between Groups	2	150.22	75.11	1.60	0.20
	Within Groups	105	4904.02	46.70		
	Total	107	5054.25			
Effort	Between Groups	2	7143.16	3571.58	6.62	0.002
	Within Groups	105	56600.83	539.05		
	Total	107	63744.00			

2.1 Critical thinking

For critical thinking ability, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 0.57, *p*=0.56. The Levene's of equality of variance was non significant (P>0.05) for critical thinking scores, indicating equality of variance between the low, medium and high metacognitive ability groups. The ANOVA revealed that there was a significant difference in critical thinking scores for the three groups, F (2, 105) = 3.72, *p*<.05, thus the null hypothesis of no differences between the means was rejected. The actual difference in mean scores between groups was considered medium; the effect size, calculated using eta squared being 0.06 (Cohen, 1988).

To evaluate the nature of the differences between the three groups further, post-hoc comparisons using the Least Significant Difference (LSD) test were used. Results indicated that the mean score for the low metacognitive ability group (M= 48.50, SD= 8.57) was significantly different (*p*<.05) from the high metacognitive ability group (M= 53.94, SD= 9.34). In addition, the medium metacognitive ability group (M= 52.66, SD= 8.62) was also seen to be significantly different (*p*<.05) from the low metacognitive ability group (M= 48.50, SD= 8.57). There was no statistically significant difference in mean scores between the medium and high group.

These results suggest that greater levels of metacognitive ability, by use of the 'Problem Solving Strategy' of the MARSI, facilitate better critical thinking styles as the high metacognitive ability group had a higher mean critical thinking score (M= 53.94, SD= 9.34) in comparison with the low metacognitive ability group (M= 48.50, SD= 8.57). Furthermore results also suggest that medium levels of metacognitive ability actually showed a lower critical thinking score (M= 52.66, SD= 8.62) than the high metacognitive ability group (M= 53.94, SD= 9.34). Overall the group that can be seen to produce the highest critical thinking scores was the high metacognitive ability group (M= 53.94, SD= 9.34).

2.2 State Anxiety

For state anxiety, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 0.21, *p*=0.81. The Levene's of equality of variance was non significant (P>0.05) for levels of state anxiety, indicating equality of variance between the low, medium and high metacognitive ability groups. The ANOVA revealed that there was a significant difference for levels of state anxiety for the three groups, F (2, 105) = 3.17, *p*<.05,

thus the null hypothesis of no differences between the means was rejected. The actual difference in mean scores between groups was considered small to medium; the effect size, calculated using eta squared being 0.05 (Cohen, 1988).

To evaluate the nature of the differences between the three groups further, post-hoc comparisons using the Least Significant Difference (LSD) test were used. Results indicated that the mean score for the low metacognitive ability group (M= 43.58, SD= 6.37) was significantly different (p<.05) from the high metacognitive ability group (M=46.53, SD= 5.88). In addition, the medium metacognitive ability group (M= 43.17, SD= 6.24) was also seen to be significantly different (p<.05) from the high metacognitive ability group (M=46.53, SD= 5.88). There was no statistically significant difference in mean scores between the medium and low group.

These results would suggest that higher levels of metacognitive ability coincide with higher levels of state anxiety (anxiety that is triggered in situational environments or when exposed to anxiety provoking stimuli) when using the 'Problem Solving Strategy' of the MARSI, as the high metacognitive ability group (M=46.53, SD= 5.88) had a higher mean level of state anxiety present in comparison with the low metacognitive ability group (M= 43.58, SD= 6.37). Furthermore results also suggest that medium levels of metacognitive ability additionally showed a higher mean level of state anxiety (M= 43.17, SD= 6.24) than the low metacognitive ability group (M= 43.58, SD= 6.37), however, overall the group that can be seen to produce the highest mean level of state anxiety was the high metacognitive ability group (M= 46.53, SD= 5.88).

2.3 Trait Anxiety

For trait anxiety, further to the above results, Levene's of equality of variances for levels of trait anxiety were not equal F (2, 105) = 6.28, p<.01, indicating there was not equality of variance between the low, medium and high metacognitive ability groups. However, as there was a roughly equal sample size across the three groups (N= 36), equal population variances were arguably not needed. Therefore, this assumption can be ignored due to the notion of population variances being equal, seeming credible. However, the ANOVA revealed that there was no significant difference in levels of trait anxiety across the three groups, F (2, 105) = 1.60, p=.2, thus the null hypothesis of no differences between the means could not be rejected.

These results suggest that there was no relationship between levels of trait anxiety within an individual and level of metacognitive ability when using the 'Problem Solving Strategy' of the MARSI. This highlights the possibility that metacognition may not be affected by individual characteristics such as trait anxiety (anxiety that is

considered a trait of personality within describing individual differences) when using this particular reading strategy to analyse and understand text (e.g. the 'Problem Solving Strategy').

2.4 Effort

For level of effort, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, $F(2, 105) = 2.91$, $p=0.059$ The Levene's of equality of variance was non significant (P>0.05) for levels of effort, indicating equality of variance between the low, medium and high metacognitive ability groups. The ANOVA revealed that there was a significant difference in levels of effort for the three groups, $F(2, 105) = 6.62$, $p<.01$, thus the null hypothesis of no differences between the means was rejected. The actual difference in mean scores between groups was considered medium to large; the effect size, calculated using eta squared being 0.11 (Cohen, 1988).

To evaluate the nature of the differences between the three groups further, post-hoc comparisons using the Least Significant Difference (LSD) test were used. Results indicated that the mean score for the low metacognitive ability group (M= 65.19, SD= 27.94) was significantly different ($p<.01$) from the high metacognitive ability group (M= 83.11, SD= 20.92). In addition, the medium metacognitive ability group (M=81.69, SD= 19.96) was also seen to be significantly different ($p<.05$) from the low metacognitive ability group (M= 65.19, SD= 27.94). There was no statistically significant difference in mean scores between the medium and high group.

These results suggest that greater levels of metacognitive ability, by use of the 'Problem Solving Strategy' of the MARSI, facilitates higher levels of effort being put in by the individual as the high metacognitive ability group had a higher mean level of effort (M= 83.11, SD= 20.92), followed closely by the medium metacognitive ability group (M=81.69, SD= 19.96), in comparison with the low metacognitive ability group (M= 65.19, SD= 27.94).

Support Strategy

A third, one-way between groups analysis of variance (ANOVA), was conducted to explore the effect of metacognitive ability (IV) on the four dependent variables: Critical Thinking score, (Watson and Glaser, 1961), State Anxiety and Trait Anxiety score, (Spielberger et al's., 1983), and Effort score, (Ziljstra's, 1993) across low, medium and high ability groups when using the 'Support Strategy' in the MARSI (The Metacognitive Awareness of Reading Strategies Inventory). Participants were divided

into three groups in accordance to how much the 'Support Strategy' was used (e.g. providing support mechanisms aimed at sustaining responsiveness to reading, such as dictionaries and other support systems) when analysing a piece of academic text. These groups were low, medium and high. The ANOVA's for each variable are reported in Table 11. The descriptive statistics associated with the dependent variables across the three metacognitive ability groups for the 'Support Strategy' are reported in Table 10.

Table 10. *Descriptive Statistics for Critical Thinking, State Anxiety, Trait Anxiety and Effort scores across the Low, Medium and High Metacognitive Ability Groups for the 'Support Strategy' of the MARSI*

Support Strategy				
DV	Support Strategy Ability Group		Mean Scores	
		N	*M*	*SD*
Critical Thinking	Low	36	53.48	8.19
	Medium	36	50.30	9.67
	High	36	51.20	9.26
State Anxiety	Low	36	44.86	6.71
	Medium	36	44.97	5.29
	High	36	43.44	6.80
Trait Anxiety	Low	36	46.11	6.21
	Medium	36	47.28	7.89
	High	36	45.36	6.44
Effort	Low	36	81.06	24.11
	Medium	36	73.44	26.24
	High	36	75.50	22.78

Table 11. *One-Way Analysis of Variance of metacognitive ability on critical thinking scores, state anxiety, trait anxiety and effort when using the 'Support Strategy' of the MARSI*

DV	Source	*df*	*SS*	*MS*	*F*	*p*
Critical Thinking	Between Groups	2	193.74	96.87	1.17	0.31
	Within Groups	105	8633.86	82.22		
	Total	107	8827.60			
State Anxiety	Between Groups	2	52.24	26.12	0.65	0.52
	Within Groups	105	4184.16	39.84		
	Total	107	4236.40			
Trait Anxiety	Between Groups	2	67.16	33.58	0.70	0.49
	Within Groups	105	4987.08	47.49		
	Total	107	5054.25			
Effort	Between Groups	2	1116.22	558.11	0.93	0.39
	Within Groups	105	62627.77	596.45		
	Total	107	63744.00			

3.1 Critical thinking

For critical thinking ability, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 0.60, *p*=0.54. The Levene's of equality of variance was non significant (P>0.05) for critical thinking scores, indicating equality of variance between the low, medium and high metacognitive ability groups. However, the ANOVA revealed that there was no significant difference in levels of critical thinking scores across the three groups, F (2, 105) = 1.17, *p*=.31, thus the null hypothesis of no differences between the means could not be rejected.

These results suggest that there was no relationship between critical thinking styles and level of metacognitive ability within an individual when using the 'Support Strategy' of the MARSI. This highlights the possibility that metacognition may not be affected by features such as critical thinking ability when using this particular reading strategy to analyse and understand text (e.g. the 'Support Strategy') as this may depend on what support tools or materials are accessible in the environment at a given time.

3.2 State Anxiety

For state anxiety, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 1.11, *p*=0.33.

The Levene's of equality of variance was non significant (P>0.05) for levels of state anxiety, indicating equality of variance between the low, medium and high metacognitive ability groups. However, the ANOVA revealed that there was no significant difference in levels of state anxiety across the three groups, F (2, 105) = 0.65, *p*=.52, thus the null hypothesis of no differences between the means could not be rejected.

These results suggest that there was no relationship between levels of state anxiety within an individual and level of metacognitive ability when using the 'Support Strategy' of the MARSI. This highlights the possibility that metacognition may not be affected by individual characteristics such as state anxiety (anxiety that is triggered in situational environments or when exposed to anxiety provoking stimuli) when using this particular reading strategy to analyse and understand text (e.g. the 'Support Strategy').

3.3 Trait Anxiety

For trait anxiety, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 1.93, *p*=0.15. The Levene's of equality of variance was non significant (P>0.05) for levels of trait anxiety, indicating equality of variance between the low, medium and high metacognitive ability groups. However, the ANOVA revealed that there was no significant difference in levels of state anxiety across the three groups, F (2, 105) = 0.70, *p*=.49, thus the null hypothesis of no differences between the means could not be rejected.

These results suggest that there was no relationship between levels of trait anxiety within an individual and level of metacognitive ability when using the 'Support Strategy' of the MARSI. This highlights the possibility that metacognition may not be affected by individual characteristics such as trait anxiety (anxiety that is considered a trait of personality within describing individual differences) when using this particular reading strategy to analyse and understand text (e.g. the 'Support Strategy').

3.4 Effort

For level of effort, further to the above results, the assumption of homogeneity of variances was tested and satisfied based on Levene's *F* test, *F* (2, 105) = 0.19, *p*=0.82 The Levene's of equality of variance was non significant (P>0.05) for levels of effort, indicating equality of variance between the low, medium and high metacognitive ability groups. However, the ANOVA revealed that there was no significant

difference in levels of state anxiety across the three groups, F (2, 105) = 0.93, *p*=.39, thus the null hypothesis of no differences between the means could not be rejected.

These results suggest that there was no relationship between levels of effort and level of metacognitive ability within an individual when using the 'Support Strategy' of the MARSI. This highlights the possibility that metacognition may not be affected by features such as effort level when using this particular reading strategy to analyse and understand text (e.g. the 'Support Strategy') as this may depend on what support tools or materials are accessible in the environment at a given time.

Analysis

Quantitative Data

Quantitative Finding 1:
Higher metacognitive ability shows higher levels of critical thinking, but does not have great impact on level of 'state' anxiety

A key point presented throughout the initial quantitative findings was that student's who are considered to have 'higher' metacognitive ability appear to show higher levels of critical thinking scores, in comparison to students who are considered to have 'lower' and 'medium' metacognitive ability. Research exploring the possible existence of different factor structures required for metacognitive ability amongst students argued that lower metacognitive ability involves less utilisation of deep learning strategies and lower levels of maths performance than their counterparts, i.e. in comparison with higher metacognitive ability (Ning, 2016). Whilst caution should be taken to generalise such findings outside of a Singaporean participant sample, this is suggestive of such elements perhaps being typical or similar contributing factors within critical thinking ability in addition to metacognitive ability, as increased performance in one such area additionally resulted in an increase in the other throughout this project's findings.

In addition, whilst some quantitative findings did show significant differences for metacognitive ability impacting on state anxiety, overall, and particularly when utilising the 'Global Reading Strategy' in the MARSI (The Metacognitive Awareness of Reading Strategies Inventory), it did not seem apparent that metacognitive ability had any major impact on 'state' anxiety, i.e. anxiety induced by environments such as educational testing environments, when looking at individual accounts. Spada et al., (2014) suggested that metacognitions in the form of negative beliefs about

thoughts concerning uncontrollability and danger could individually contribute to state anxiety. As all four students scored similarly for this, these results may suggest that the perception of the testing environment triggered similar metacognitions in all four students, independently of metacognitive ability, and therefore did not show great variation in its levels.

Quantitative Finding 2:
Higher metacognitive ability shows higher levels of effort and lower levels of 'trait' anxiety

Another key argument that was presented throughout the initial quantitative findings was that student's who are considered to have 'higher' metacognitive ability appear to show higher levels of effort, in comparison to students who are considered to have 'lower' and 'medium' metacognitive ability. However, research that explored the learner's perspective within a metacognitive process that expresses the learner's ability to monitor their own comprehension (e.g. the calibration process), found that learners did typically express a 'feeling of knowing' towards their work, but that this feeling differed between low and high ability groups, and importantly constituted factors such as effort (Blume et al., 2017). From this view it may be argued that students with higher metacognitive ability actually may put in lower levels of effort due to them having an increased tendency to believe they have done well, perhaps based on previous experience or grades, and therefore may possess a 'feeling of knowing' they have done well. Subsequently in reverse, students with lower metacognitive ability may put in higher levels of effort in order to improve on their past experiences or grades. In contrast to these findings however, as the quantitative results would suggest, it could be that higher metacognitive ability actually encourages higher levels of effort in order for a student to sustain receiving positive feedback within education. Regardless, these findings are suggestive of something besides metacognitive ability appearing to facilitate effort level, such as 'the feeling that you will ace it', 'knowing you will fail it' or other dispositional qualities.

In addition, and particularly when utilising the 'Global Reading Strategy' in the MARSI (The Metacognitive Awareness of Reading Strategies Inventory), it was also apparent from the data that student's who are considered to have 'higher' metacognitive ability appear to exhibit lower levels of 'trait' anxiety, i.e. anxiety that is considered a trait of personality within describing individual differences. However, research that has explored the relationship between temperament, trait anxiety and maladaptive metacognition suggested that anxiety was strongly associated with metacognition, and that this highlighted the significance of metacognition as a factor influencing the temperament/trait-anxiety relationship (Dragan and Dragan, 2013).

Such findings suggest an alternate argument of higher metacognitive ability actually facilitating increased levels of trait anxiety within individuals. Irak and Tosun (2008) also argued that increased metacognition would be highly correlated with anxiety amongst individuals with additional individual factors (such as mental health disorders, i.e. obsessive- compulsive disorder), but importantly, that it was this metacognition that fully mediated the relationship between such symptoms and anxiety. Additionally within these findings, meta-cognitive beliefs regarding anxiety did not differ amongst symptom subtypes, reinforcing the notion that elements such a 'trait anxiety' are in fact inherent to many other predispositions for an individual and may vary completely due to these factors, despite level of metacognitive ability.

Results

Qualitative Data

Overarching themes:

1. Fluid Identity within University
2. Outcomes Over Learners Throughout Education
3. Success within Education: 'I'm Only as Good as My Grades'

Sub themes:

1) Identity within University: motives and subject choice
2) Struggle regulating the self at university
3) Psychology and type of person we identify with
4) Education: the product of a desired outcome, not the individual learner
5) Greatest hindrance to learning: personal experience vs. education style
6) 'Success' in education, a personal achievement vs. societal perception
7) Raising anxiety in education
8) Procrastination and leaving work to the last minute

Initial Categories:

- What is the meaning/ value to the person?
- Identity: Academic identity/ type of person
- Feeling Anonymous
- Learning lacking meaning
- Lack of reflection – autopilot
- Rigid education
- Effort driven by fear/ anxiety

- Fear of grades
- Positive feedback/ worth and self-belief

Analysis

Qualitative Data

Fluid Identity within University

Whilst many initial themes were identified amongst comparison of accounts from the four individual students, one powerful theme that emerged throughout was the expression of identity within the university context. In particular, what this notion meant in relation to 'being a student' within university and how this changed over the course of the university experience. As suggested in the below quotes, it was clear that whilst the concept of identity is usually considered a personal trait or individual phenomenon, the social context of simply being at university was reflected back on to the learner, and in some instances seemed to bring about an actual conscious behavior change in regards to the adjustment of individual student's qualities to mirror those of them around them. This notion highlights the importance of the learner's environment, i.e. being immersed in to a whole new context of various cultures and settings, and to what effect this has on the identity that learners mold for themselves, suggesting that for at least some time, identity at university may be somewhat 'fluid'.

Lee:

> *"Things that make up you're identity… I believe that a lot of it comes from social aspects, friends and family, the people you're most around because you adapt your behavior in a general sense to conform to the behaviors of those around you to seem more socially desirable"*
>
> *"I wouldn't be able to say that my identity changed because of being a student, it just changed as well as being a student"*

Samantha:

> *"I've definitely changed as a person since I started [university]… that was a completely different version of me, it definitely changes you as you meet so many different people… people are kind of finding out who they are when they come to Uni [university]"*

"[Identity] it definitely changes, you meet so many different people and you find out things you like or don't… it's just like a massive learning curve so I don't see how you could not change when you're here [university]… that's just strange"

Blake:

"You could be a happy person going into university, but because of all the stress it can cause you… sometimes your identity could change and you could become more… erm socially reserved I guess… because you need to put the effort in"

Overall these accounts are extremely interesting as, despite working at various points on the 'ability' scale, for the students even though the context of their individual experience differed, similar references were implied that it was their immediate environments that ultimately contributed to the identity they were holding for themselves now at university. Research suggests that differences in identity statuses, particularly as students negotiate the transition to a university context, accounted for significant variation in the students' progress on measures such as academic autonomy, educational involvement, and mature interpersonal relationships (Berzonsky and Kuk, 2000). As such, the student's own lived experiences of university, and ultimately their own understanding of what attributed towards their identity, were both contextualised by who they surrounded their selves with whether intentionally or unintentionally.

Therefore, one crucial point appears evident in the form of we cannot separate the learner away from the social and cultural world they inhabit. Bronfenbrenner (1994) regards such proximal interactions, known as the microsystem, to be the primary engines for growth and development, and for both students it appears these primary interactions with their immediate relationships (peers, family, school, etc.) played a big role in developing their identity, and perhaps even in their perception towards the learning environment. Therefore, if the context of university or simply 'being a student' can bring about either a conscious or subconscious influence on the identity that learners adopt for themselves, it follows that a focus on enhancing and developing positive learning strategies, techniques and personal growth for learners within this 'fluid' or 'impressionable' period should be duly considered by educational facilitators.

Dakota:

"Some of my interests… are saying to parents that actually, some of this you're going to have to take on board yourselves as parents… like the schools are good but it might not fit for your child"

Samantha:

"I needed to do something with my life, I needed something more fulfilling than talking about the same thing everyday with the same people… I wanted to help people"

"[University] it does feel like you're anonymous in the actual course though… there's not actually a lot of interaction … [psychology] it's very much a solitary field"

Lee:

"I decided to come to University as I got bored and psychology was something that interested me, I knew I wanted to do something that interested me rather than a full time job I was going to hate"

"University is a lot different to school when your class is small, I don't think I've had many conversations with most of my lecturers…. You just feel a part of it [university], not really something that makes it feel whole and valued"

Furthermore, throughout the transcripts it appeared that the reasons for why students decided to come to university in the first place were similar amongst students, perhaps particularly psychology students. Firstly from the above quotes, it can be implied that the students wanted something 'more' out of their future careers that differed to their lives at the time, despite not being exactly sure of what their end goal was. These similar and inspiring motives for pursing this route into education, e.g. the notion of 'wanting to help', were interesting as this seemed to feed back into the identity learners held for themselves at the time when they were asked, i.e. the notion of 'I am a person that wants to make a difference'. It follows that if students choose to pursue higher education, particularly subjects in the social sciences such as psychology, for the main reason of either interest, being able to 'do something meaningful', or 'to help people' whilst holding this notion as something that is intrinsic to their identity, their lived experience, interpersonal interactions and the social reality of university life may contribute to whether this factor is upheld. By extension this also raises question to whether identity can indeed change or become 'fluid' for a time, depending on the context and motion of these experiences. In addition, if these motives are qualities or factors that learners find largely positive about the identity they hold for themselves, i.e. elements of their

selves that they 'like', whether not these views can be upheld during university may also be influencing or causing a change on other notions, such as self-esteem, etc. Research suggests that people can be motivated not only to see themselves in a positive light e.g. the self-esteem motive, but their identities as being continuous over time despite significant life changes, that they are competent or the self is capable of influencing their environments, and that they are accepted within their social contexts as a result of the elements (Vignoles, 2011).

In light of this elements of the student's experiences, as evidence from the previous quotes would suggest, imply that the social context of which students become immersed in during university and the actual learning experience, i.e. the course itself, can also play a crucial role in influencing on identity. In the ecological model, the individual is viewed as both a product and producer of their own development in which, similarly, peer relationships are regarded as important in being both a product of and an influence on personal development (Bronfenbrenner, 1994). Therefore, whilst students may enter university with a strong sense of self or with motives that they may regard as positive elements of their identity, such as an interest for the field or 'wanting to help people', it would be interesting to see if the same traits are upheld when students leave university after completion of their course. This is due to the notion of some students seemingly regarding their actual experience of learning on their chosen course, e.g. undergraduate psychology, as quite 'isolating' and lacking in making students feel valued at an individual level, differing perhaps to their previous educational expectations or original motives for pursing the subject that suggested a desire for fulfilment, wanting to 'help' or having a pure interest in the field. This therefore presents the question of whether the immersion of students in to a whole new context of various cultures and settings, mixing with other learners from a variety of ages or backgrounds, and continual exploration of their chosen subject combined with a partially 'isolating' or 'solitary' subject learning experience in reality, ultimately contributes to the identity students hold for themselves upon exiting the university experience, and whether such identity can in fact become 'fluid' for a time during this adjustment.

Outcomes Over Learners Throughout Education

During the interview process, another key theme that emerged across the student's experiences was the notion of learning within higher education being greatly centered on the process of obtaining a grade or an 'outcome', rather than a focus on the experience of learning itself. In addition, how instances of past educational experiences with similar notions played a part in shaping the qualities that learners have at university now, e.g. factors such as self-esteem, effort or motivation. In this light, as suggested in the below quotes, how students perceived and regarded their

learning experience within university seemed to be influenced by both previous personal experiences and various external factors, whether it be feedback from grades, or university relationships. However, in some instances these important factors were also implied as having an absence of real meaning or value to the learner, therefore appearing 'lacking' in some way. This notion highlights the importance of acknowledging the role of both immediate and distal influences for students during the university process. In addition, how these influences may have influenced learners previously throughout their life, but also the meaning that the learner holds for these factors now as this may impact on how they perceive the entire learning experience.

Dakota:

> *"Once you have that piece of paper [degree certificate or grades] it's like well 'I was this anyway'… you just needed that piece of paper"*
>
> *"If I never work again after [university] it's not a problem because I've had a good career… for me it was about the paper, I've only got a diploma so it was about that for me"*

Blake:

> *"If I get the grade that I didn't want… it just feel really disappointed and in turn it makes me worry about the next set of grades, it can put me down sometimes'*
>
> *"I'd say I feel valued by friends [at university], but not really valued by any of the lecturers, or the university itself"*

Lee:

> *"It feels a lot better when you get a grade back and it's higher than you were expecting… it's a nice sort of, surprise for yourself to show that you're actually capable of doing things"*

Samantha:

> *"[Regarding getting grades back] I shut my eyes… and I have to wait a second before I can open my eyes again and look at it… I want to stay in that weird kind of limbo where I don't know how I've done. I'd rather be there than knowing I've done like really, really bad on something"*

These accounts are intriguing firstly as, whilst these students would have undoubtedly had university experiences that differed in some way, the students all

made reference to the importance and impact grades had on their learning experience. Furthermore, it seemed that individuals held strong meaning for their grades or feedback largely in the form of validation or confirmation, but additionally how in turn these outcomes then seemed to greatly impact upon the learners themselves, either via elements such as self esteem, anxiety or motivation for the next assignment. Systematic reviews and meta-analyses concluded that evidence did not support the use of grade retention as an intervention for academic achievement or socio-emotional adjustment (i.e. emotional adjustment, peer competence, problem behaviours, and self-esteem), and that an over reliance on grade retention was related with negative effects on student mental health (Anderson et al., 2002). The student's lived experiences highlight the real emphasis on grades or outcomes within higher education, specifically the amount of importance learners place on these elements in oppose to other possible opportunities to enhance and better learning. This does seem to suggest that the transition through university may lack meaning in terms of how the learners themselves feel about the subjects they are pursuing, and also possibly within the knowledge or insight that is perhaps present in learners, but not picked up or recorded within a series of measures from a pre-determined curriculum.

The phenomenon of grades and outcomes holding such meaning and importance throughout the learning experience of education for students once more suggests that we cannot separate the learner away entirely from the larger socio-cultural context they exist in. Bronfenbrenner (1994) argues that educational systems form part of the macrosystem, i.e. a larger cultural context that previous immediate systems are embedded within to which an individual may seem far removed, such as government policies or international agreements, but that these factors do often impact on the individual's life. Therefore if educational systems are constructed in a way that is rigid to only favour the achievement of certain grades and outcomes typical of a certain type of student, possibly to enhance the process of progressing on to the next stage of education (e.g. a learner that has a achieved a certain set of grades may access university), rather than emphasize the benefits of the learning process as a whole for students, alongside encouraging different learning styles, many other types of learners may be disillusioned or discouraged to pursue higher education. In addition, if this is the core message being facilitated throughout various levels by the education system, i.e. that it is only meaningful to achieve a certain grade or stamp of achievement rather than to expand on continual learning development, gain useful knowledge, or bettering understanding, it also follows that the learner's perception on such influences may not be acknowledged in a positive light, if at all. Therefore students may view their learning experience as negative or isolating, to which educators may need to be aware of.

Dakota:

> *"Statements that you've held on to from being a child… what it has done is helped to condition fear, academic fear. I try not to come forward [in education] now, so as not to feel exposed… I'm so frightened, it's a kind of paralysis"*

> *"I was taught by a couple of people that were teachers by trade and the minute you went off their script, I was considered a problem… if I asked them a question that wasn't in their lesson plan it was problem"*

Blake:

> *"I'll stay until 3am to finish an essay because I want to make sure it's the best I can do… I put a lot more effort in than I did at A Level because I didn't get the grades that I wanted"*

Samantha:

> *"[Regarding stepdad] he might as well have had a PowerPoint presentation about how bad I was as a human being… so I've always kind of had that to battle with"*

In addition, within the transcripts it also appeared evident that previous educational experiences had a similar undertone of the importance of grades perhaps being favoured over learners, and seemed paramount to how the students engaged and interacted within their university experience now. From the above quotes, the students often implied that their past experiences within education had an influence on their learning now in a manner of ways, often via fear or extrinsic motivation. However these experiences are interesting as the students arguably portrayed them in a largely negative light rather than referencing more positive past learning experiences. This may suggest that if a student encounters a negative experience within education, they may be more likely to recall these negative experiences more frequently over any possible successes. It follows therefore why grades may be seen as critical in education to students, not only from wider educational systems implying pressure externally, but also from personal negative experiences within education in which the core message may be that a learner's own viewpoint is either incorrect, or that only certain grades are worth value and effort.

From such experiences, it is possible that these influences result in students never being able to showcase their true potential, or alternatively fail to be satisfied with grades possibly due to the continuous reinforced notion of striving to do 'your best'

but then also being expected to improve on this next time. In either of these suggestions, there is a likelihood that students may therefore notice and pay attention more so when receiving a 'negative' grade in comparison to a 'positive' one (depending on their perception of these elements), as they may recall such prior beliefs from previous educational experiences more easily, rather than feelings of satisfaction or validation from any past academic encounters. Research has suggested that the method of various grading systems over actionable feedback, that promotes trust between educators and students alongside enhancing cooperation amongst students, have been seen to reduce academic motivation and enhance anxiety or avoidance of challenges within education (Chamberlin et al., 2018). These experiences may therefore suggest that educational systems should be re-evaluating in which programs, and at which times, strict grading systems may be appropriate to administer, in order to reduce the heavy importance currently being placed solely on achieving a single outcome and therefore also possibly minimise the facilitation of previous negative educational experiences being funnelled into higher education during this process.

Dakota:

> *"Classrooms sometimes just feel a bit too close and intimate… and I can't hide… I'm usually absorbing information and if someone asked me what I just said I can get into this anxious state"*

Blake:

> *"Uni life… that doesn't make me anxious at all because we all commute … I just hang around with the people I hung around with before'*

Lee:

> *"What affects my experience of being a learner most is… procrastination and, in a sense my social group… a lot of my time spent will be seeing my friends… and then just never getting round to it"*

Samantha:

> *"I'm just kind of gravitated towards people that are kind of… have the same values as me"*

However in addition to possible larger cultural contexts, such as educational systems, having an impact on how an individual feels within education now, as evidence from the previous quotes suggests the immediate surroundings and context may equally impact the learner, whether that be past negative experiences within education, or relationships in a social context now. From an ecological

perspective, characteristics of the environment and the nature of the links among the individual's immediate settings play a role in determining the strength of the effects on the development of an individual (Bronfenbrenner, 1994). Therefore, more proximal influences, such immediate peers or friends, within a student's life may also contribute to how they experienced learning within university. For example from the above quotes, it is evident that for one student the social context of the learning settings made her anxious in addition to negative past educational experiences. In this light it may be possible that if students feel uncomfortable to participate within the social context, they may withdraw and focus on their own personal progression, such as grades, which in turn may make the university experience appear isolating and lacking in meaning. Alternatively, other students that socialised often or remained close with old friendships whilst at university may have felt less anxious due to possibly not having the need or desire to explore new contexts as strongly as other students. However this may then cause distraction, or in one case, result in students becoming withdrawn due to socialising needs being satisfied from existing friendships elsewhere, allowing them to have more time to focus on grades within the university environment. In any case these experiences suggest that if it is appears that students are only there to achieve an outcome rather than a meaningful experience, the university experience may appear to lack meaning. As a result, the above factors suggest that the effects of both immediate and distal relationships over the entire learners life must be considered when reflecting on what acts as a barrier to learning and how learning may be being perceived and experienced by students.

Success within Education: 'I'm Only as Good as My Grades'

Following on from this, another theme that appeared prominent throughout comparison of all four individual students experiences was the perception of 'success' in education and how in some instances this was once more being attributed to the achievement of grades. However in some experiences, the students perceived the simple truth of just being at university to hold meaning in the form of being considered 'successful' as learners. As suggested in the below quotes, it was apparent that most of the students attributed the feeling of success towards the achievement of a certain grade and by extension, the very status of attending university. Importantly, whilst all of these experiences will have been invariably different for the students, the notion that most learners do not actually 'accept' themselves for the types of learners that they are, or are continually striving to do better within education, was prominent. This highlights the possibility that the university experience alone may hold a deeper meaning for learners in the way of higher education almost seeming the 'gold standard' for success to learners. As a result, it is therefore also important to consider the elements that may lead to

student's feeling 'unsuccessful' in learning in contrast, e.g. possibly by having a fear of failure and thereby producing elements such as procrastination or lack of confidence in learning.

Q: Would you describe yourself as being successful within education?

Dakota:

> *"Yes, in that I'm here [at university], I'm a student here and for me part of my education is in my practice… I can learn and it well… changes the way I think about things"*

Blake:

> *"I'd say I've been alright… at GSCE I mainly got C's and B's… and within first year of university I'm getting first's and 2:1's mostly, which I'm really happy about"*
>
> *"I feel because it's a subject that I actually care about, I haven't been forced to do it as we choose to come [university]… I feel like that helps me to be successful. The fact that I am successful, it feels like I deserved it and I earned it myself because I've put a lot more time in"*

Lee:

> *"I'd say I'd describe myself as being successful within education cause I get… good enough grades at university. I've always been, not terrible, but not amazing in school"*

Samantha:

> *"It depends on what part of my education you're looking at… I dropped out half way through A-levels. I was ok. I was average… so far at uni [university]… I've finished with a first. So I'm really proud of myself. So yeah, I'd say I'm successful in university"*

The above quotes did seem to highlight that some students reported their experience of success within education as being centred around feeling more in control of their learning, i.e. that they were now studying a subject that they care about, or alternatively that their university experience enabled the individuals to better their own learning practice in some way. However, the notion of 'I'm only as good as my grades' was arguably also apparent as most students attributed their feelings of success once more to the achievement of certain grades or university status over other, arguably important, learner qualities. While research suggests that

large socio-economic differences in academic performance exist at the point of entry into university, these differences were found to substantially reduce during the experience of university and were shown to have little effect on grade attainment (Delaney, et al., 2010). In light of these findings however, despite the suggested weakening socio-economic effect on grade attainment, a key finding was that large socio-economic differentials in the earnings expectations of university students still remained. These results therefore suggest that whilst socio-economic factors in isolation may have less impact on retaining certain grades throughout the university experience, there may be underlying factors from these influences that suggest why students attribute grades or university status to feelings of success. For example whilst individual contexts differ, arguably if a student's experience exists within a less advantaged socio-economic background, including the possibility of being part of a minority group or a first generation student, the status of being at university and the potential for higher income retention for this student may differ and be considered more of an achievement indicating 'success', in comparison to a student's experience existing within a middle-class background, in which both parents may have attended university, and where such an achievement may be considered more of a normality.

Once more, the above experiences suggest that in order to consider how students perceive feelings of 'success' in education, influences from the immediate environment must be considered as well as the interaction of the larger environment. Bronfenbrenner (1994) considers the principles defined by an individual's macrosystem to have a cascading influence throughout the interactions of all other layers. In this light, if it is promoted from wider system influences that education is the key to career sustainability and higher incomes, and that as a result a student must achieve a degree to increase their chances of pursing this, then attending university and upholding certain grades to sustain this process may well influence the individual's learning experience. In addition however, proximal interactions from within the microsystem, such as parental relationships or more immediate family expectations, may also impact on this experience (Bronfenbrenner, 1994). For example, as previously mentioned, parental or family achievements, class status, household income and socio-economic background may also determine how 'successful' a student feels within education. As a result, it may also be these proximal interactions in addition to wider system influences that impose on other aspects, such as family or cultural pressure to pursue certain careers, which may shed light on why the upholding of certain grades and university status appears to equate to feelings of success in some learners. This highlights the importance of considering the wider impact that grades may have on students and how education may be facilitating these standards, as oppose to helping individuals develop better learning qualities and habits that may become of use after the

university experience, for example promoting positive attitudes towards self worth or confidence as oppose to 'I'm only as good as my grades'.

Q: Have you always felt this way or has this changed as you've progressed through education?

Dakota:

> *"It comes in my response… the responses that I get from other people… being given erm responsibility, if other people have identified that I'm capable… it makes me realise that they've seen a skill and I haven't registered it"*
>
> *"It's sold me into situations… because I have certain philosophies about erm life and what I want… in order to get the outcomes that I want, mainly for other people, erm I've had to put myself out there"*

Blake:

> *"I'd say I haven't always felt this way, like I've said it just depends on the subject. Now I've progressed through education and I've made it [to university]… it's definitely has changed and I'm more successful because I care about it, the subject"*
>
> *"I guess one thing that would affect your experience of being a learner would be just the fact that you've got to have that mentality, the personality that will make you want to work hard and succeed"*

Lee:

> *"I've always… sort of always felt this way. I got decent grades in high school. Growing up, I was always a generally smart kid"*
>
> *"I still get enough positive feedback to make myself feel like I'm good enough at what I do"*

Samantha:

> *"[Previous in education] I didn't have any direction and I didn't know what I was doing it for… but now it's kind of like it's my choice to be here and I'm doing it for a purpose… plus I'm paying for it this time as well"*
>
> *"I'm actually living up to my potential now. I'm not just kind of coasting along anymore"*

In addition, throughout the transcripts it appeared that the student's responses differed in regards to whether such feelings of 'success' had always been there, or whether these elements had changed over time throughout education. From the above quotes, it was apparent that in some instances the notion of receiving positive feedback, e.g. via grades, consistently throughout education contributed to feeling 'successful' at university, in comparison to other students feeling that their freedom to choose a subject that they held meaning for, thus enabling them to achieve the outcomes that they wanted or wished to achieve for others was more pivotal towards feelings of 'success'. These experiences are interesting as it appears the concept of 'success' to the learners, when immersed in an academic environment, was in response to both present factors (such as grades and feedback) but also was compared against previous experiences throughout an individual's educational timeline. Research has argued that perceived subjective success has a much larger influence on objective success (e.g. level of income and hierarchical position), and that such objective measures of success had no influence on elements of more subjective factors, such as job satisfaction (Abele and Spurk, 2009). In this light the concept of 'success within education' therefore becomes interesting as, if like the above accounts suggest, success is being perceived as in alignment with the amount of qualifications needed for factors such as social status or income, in addition to grades potentially becoming harder to maintain, success is perhaps going to hold more meaning for the learner each time they receive a grade. Consequently, the notion of student's believing they need to be successful in education in order to 'achieve' possibly becomes more greatly enhanced.

It may therefore be of note to consider how these important subjective experiences and perceptions of 'success' would change firstly over the course of one individual learner's time within education, but also how wider influences may have changed over time generally within the system, that may also be contributing to learner's experience of university today. In ecological systems theory, the chronosystem is considered the time period in which one lives and may also include life's transitions, changes and continuities occurring over time that influence an individual's development (Bronfenbrenner, 1994). Therefore, whilst it is evident that influences from more proximal socio-economic factors may once more impact on the learner's perception of success (either via immediate relationships, feedback or validation), consideration of how the wider educational system has changed over time may provide clearer insight into the experiences of learning for individual students today. Arguably reflection on the influence of the chronosystem, i.e. impact over time, may shed light on what influences are evident for today's generation of students. With more freedom of choice and opportunity of career progression, alongside however arguably increased pressure to maintain educational gain or achievement as the bare minimum due to higher education becoming more of a normality, the concept

of being ‘successful’ today within education may mean something different to the previous decades. In this light, the cumulative effects of the entire sequence of transitions over an educational time span suggest importance when considering how students live the experience of learning, especially when compared to the controversial progression within the academy itself.

Comparisons

For the purpose of demonstrating the opportunities afforded by mixing the two methodologies of quantitative and qualitative data as explained above, equal weight has been given to the two approaches during analysis. However, in order to consider what in depth patterns or contradictions emerged from such analysis, three main comparison and contrast points will now be explored via further consideration of how the three presented themes seemed to support or contradict the associated quantitative findings.

1) Comparison Point One:

- Quantitative Finding: Higher metacognitive ability shows higher levels of critical thinking, but does not have great impact on level of 'state' anxiety
- Qualitative theme: Fluid Identity within University
- Student Accounts: Samantha and Lee

One powerful theme that supports this quantitative finding is one that emerged throughout a closer inspection of the experiences of the students with the perceived 'highest' metacognitive ability in comparison with 'lowest' metacognitive ability. On reflection of the two individual accounts, 'Samantha', who was rated the highest for metacognitive ability out of all the four students, highlighted that her grades appeared to be linked with her own self-confidence or worth and in this way the notion of 'I should be doing better' or 'I'm not good enough' was common throughout. This suggested meaning in the form of particular students thriving due to the identity they hold for themselves within university, as in comparison 'Lee' who rated the lowest for metacognitive ability, expressed meaning in the form of early childhood experiences of the academic world staying with you for life, e.g. 'If you felt not good enough from school or family as a child, this may flood in to your adult experiences'.

Dye and Stanton (2017) suggested that students who have greater awareness and can elicit control over their thinking typically learn more and can perform better than those with lower metacognitive ability, however a tendency was also found for students to continue practicing behaviours even when they knew it was ineffective, to avoid discomfort. It can be argued therefore that the prospect of this discomfort may result in student's continuing with less effective methods of learning, despite knowing there are more efficient ways, due to alternative factors or beliefs. An example of this being if students believe they are capable of change and improvement or not, or if they possess motivation to do this. As a result, these factors seem to support the quantitative finding of perceived metacognitive ability facilitating higher critical thinking ability, but in addition that it is perhaps the

individual's perception of their own ability and the identity they hold for themselves within education, deriving from the context of past educational experiences, that may contribute to this and shape how the learners present themselves now. For example, if it is encouraged from an early age that success is paramount and this is only to be obtained by high grades, this learner may have had to adopt better variations of metacognitive strategies to help retain and learn information in order to achieve this and avoid disappointment. This is in comparison to a learner who has been discouraged and 'put off' bettering their learning strategies from an early age as they may have seen no 'point' due to their past experiences, and possibly discouragement. Both of these notions perhaps point to wider socio-cultural influences, such as the microsystem, shaping educational strategies or methods of learning.

In addition, these factors also seem to support the quantitative finding of perceived metacognitive ability not having any major impact on state anxiety for the different students, as following on from the above points it may in fact be the meaning the learners hold for their own identity within education and the type of learner they consider their selves to be, that determines their level of anxiety and not the educational setting itself by any extremity. Research exploring how metacognitive beliefs align and change with state anxiety levels within athletes prior to competition revealed that specific metacognitive beliefs were differentially predictive of state anxiety dimensions (Love et al., 2018). In a similar way allowing for a change of context, all students showed this type of anxiety but appeared to show similar levels, therefore it can be suggested that the state anxiety dimensions were relative for all four students as this was dependent on the similar beliefs and meaning they held towards it, e.g. all students found the testing environment a comparable amount of anxiety provoking.

2) Comparison Point Two:

- Quantitative Finding: Higher metacognitive ability shows higher levels of effort
- Qualitative theme: Outcomes Over Learners Throughout Education
- Student Accounts: Dakota, Blake and Lee

On further reflection of the experiences of the two individuals who were neither perceived as the 'highest' or the 'lowest' in metacognitive ability, interesting themes became apparent that appeared to further contradict such findings. However, it was only after comparing these two accounts with the experiences of all four individual learners and consideration of these combined, that particular areas of interest emerged. On an initial glance, 'Dakota' who was rated the second lowest for metacognitive ability out of the four students, presented with the lowest effort level

score out of all four students. However, when compared to 'Lee' who was rated the lowest for metacognitive ability, he presented the highest effort level out of all four students. Therefore when inspecting individual cases against one another, a disparity occurred within this finding as it would seem level of effort and metacognitive ability were mutually exclusive. After considering what may be influencing student's effort level instead, one powerful theme that emerged in contrast was the notion of education not being about the learning experience at all, or even the learner themselves, but merely it's focus being on an objective or desired outcome. 'Dakota' highlighted that in her view the education system was merely about 'achieving grades and passing tests', rather than a focus on the learning process itself. As a result of this she found herself regularly 'trying to do better' than the previous grade, never being satisfied with the outcome or appreciative of the quality of work. This may also suggest meaning in the form of student's effort levels increasing for elements of work that achieves a grade.

In a similar way, 'Blake' who rated the second highest for metacognitive ability expressed a similar view within learning not being about the individual learner, as he expressed experience of not even having to be right in what he was saying, as long as it is 'reflected in the masses' and that naturally the type of work that inflicts the most fear is work that requires own opinion for a grade. Research aimed at exploring metacognitive knowledge of effort alongside other factors, such as the effects of mood and personality factors, suggested that a positive mood, personality factors, and feelings of difficulty towards the task predicted an estimate of effort (Efklides et al., 2006). Only these feelings of difficulty predicted the retrospective estimate of effort and no effects of metacognitive knowledge were found to be contributing. Whilst such findings did not record the effect of metacognitive ability on effort level directly, they do seem to support the notion of wider, additional factors influencing on effort level. In a similar way, both accounts from the individual students seem to suggest a viewpoint that highlights the impersonal and detached nature of education, regardless of metacognitive ability, with the emphasis being on a grade or a mark rather than the experience of the learning process or the learner themselves. As such, theses factors seem to contradict the quantitative finding of higher metacognitive ability facilitating higher levels of effort, as these accounts suggest that level of effort was irrelevant of metacognitive ability. This gestures towards many other intriguing possibilities, including perhaps the student's outlook on the education system itself and the level of importance they hold for acquiring a certain grade, that may facilitate effort level independently of metacognitive ability; highlighting once more the need to consider the inner meaning.

3) Comparison Point Three:

- Quantitative Finding: Higher metacognitive ability shows lower levels of 'trait' anxiety
- Qualitative theme: Success within Education: 'I'm Only as Good as My Grades'
- Student Accounts: Dakota, Samantha, Blake and Lee

Once more, it was only after comparing the accounts and exploring the experiences of all four individual learners combined that it became apparent trait anxiety appeared to be evident across all four students within varying levels, not in a linear fashion. Indeed from closer inspection, and in contrast to the suggested quantitative findings above, the students that presented with the lowest level of trait anxiety (Lee) and the highest level (Dakota) were the students with the lowest level of metacognitive ability overall, and therefore contradicts the finding that higher metacognitive ability facilitates higher levels of trait anxiety. However importantly, the topic of anxiety was heavily situated in the experiences of all four students when they talked about the self and their experience of learning, which would be coherent with features of trait anxiety (i.e. anxiety that is considered a trait of personality within describing individual differences).

One powerful and reoccurring theme that emerged from the accounts instead was the notion and the desirability to be 'successful' within education and how this played a role in contributing to other factors, such as their level of anxiety. All four students presented with similar motives for wanting to pursue higher education, i.e. 'that education provides purpose, direction and self- satisfaction, as it is an opportunity to better the self'. However on further exploration it seemed that no student could provide an answer on why we needed to specifically go to university to feel valued in education hinting at the notion of 'success' being a very external achievement rather than an internal one. Interestingly, some students expressed thoughts of being viewed as 'more successful' if it was their choice to go to university and study the subject they wanted, however importantly all students seemed to acknowledge that it was good grades that were pivotal to feelings of success at university. The notion of 'I'm only as good as my grades' was evident throughout as the student's expressed their grades were almost 'stamps of self acceptance' that contributed almost directly to their self worth and overall confidence in education, even for students who's trait anxiety was lower.

Research that analysed the effect of meta-cognitive elements but also trait anxiety symptoms within mental health issues, such as depression, demonstrated that metacognitive beliefs were significantly effective on prediction of such symptoms (Delavar et al., 2014). Importantly, a part of trait anxiety was found to be predictable

by metacognitive beliefs and also amongst other elements related to these metacognitive beliefs, such as low cognitive trust and general negative beliefs, which may also influence trait anxiety scores. In this light it can be inferred that having higher metacognitive ability (and therefore possibly increased metacognitive beliefs) may actually result in higher levels of trait anxiety despite earlier findings. Once more however, these findings are also rather suggestive of the individual's own outlook and internal beliefs holding relevance to factors such as trait anxiety in a more general sense. For example, also within this theme and within higher education it was expressed that the pressure to 'do well' generally is one that continuously builds and the associated anxiety that increases with this also influences other areas, such as procrastination in the way of student's pushing their work away every time despite knowing this will just build anxiety. Therefore, this in turn may easily generate negative metacognitive beliefs in regards to the self that contribute to factors such as trait anxiety. This notion may explain why similar experiences were seen across all four of the individual accounts regardless of metacognitive ability, as opposed to metacognitive ability having a linear effect on higher levels of trait anxiety as quantitative results initially suggested.

Discussion

Quantitative Perspective

In regards to the first aim, the present study firstly offers further support that higher metacognitive ability shows higher levels of critical thinking in comparison to students who are considered to have 'lower' and 'medium' metacognitive ability. These findings suggest that increasing the usage of a variety of coping strategies that facilitates metacognitive awareness within learning, such as the three subscale categories of the Metacognitive Awareness of Reading Strategies Inventory (MARSI): Global Reading Strategies, Problem- Solving Strategies and Support Reading Strategies (Mokhtari and Reichard, 2002), it may be possible for an individual to improve understanding and learn how to analyze complex tasks, particularly for students who may struggle with critical thinking. Such findings appear to align and build on existing research in this area, as metacognitive strategies have been found to have a positive influence on a student's ability to self-regulate, contributing to the notion that metacognition awareness can result in better critical thinking (Nash-Ditzel, 2010). In a similar light, it has been argued that educators view critical thinking as an essential skill, as results from meta-analyses suggest that both critical thinking skills and dispositions improve substantially over a normal learning experience (Huber and Kuncel, 2016). In addition, empirical evidence on the impact of instruction, regarding the development of critical thinking skills and student achievement, suggested that there are effective strategies for teaching critical thinking skills, both generic and content specific, at all educational levels and across all disciplinary areas (Abrami et al., 2015).

However clarity on how effectively these elements are being taught within higher education appears lacking in addition to curriculum-wide efforts aiming to improve critical thinking indicating they do not necessarily produce incremental long- term gains (Huber and Kuncel, 2016). Despite this, the opportunity for dialogue, exposure of students to such examples, and mentoring on the subject has previously been seen to have a positive effect on the development of critical thinking skills, suggesting that the present study offers impetus for future work that may assess such factors in addition to interactions of metacognitive strategies to enhance critical thinking skills within a higher education environment (Abrami et al., 2015).

In addition and on extension of the first aim, the study also explored the effect of metacognitive ability on sub- components, such as state anxiety, trait anxiety and effort level. Importantly, whilst some quantitative findings did show significant differences for metacognitive ability impacting on state anxiety, overall, and particularly when utilising the 'Global Reading Strategy' in the MARSI (The Metacognitive Awareness of Reading Strategies Inventory), it did not seem apparent

that metacognitive ability had any major impact on 'state' anxiety, i.e. anxiety induced by environments such as educational testing environments, when looking at individual accounts. However in a similar light, particularly when utilising the 'Global Reading Strategy' in the MARSI (The Metacognitive Awareness of Reading Strategies Inventory), it was also apparent that student's who are considered to have 'higher' metacognitive ability appear to exhibit lower levels of 'trait' anxiety. Students with 'higher' metacognitive ability also appear to show higher levels of effort.

Such additional findings may align with elements of Self-worth Theory (Covington, 2000) on the assumption that students may base their sense of self-worth on academic performance and achievement, resulting in feelings of 'worthiness' only after having achieved the necessary grades they deem a measure of self-worth. In regards to trait anxiety, if students place emphasis on competency and doing well in academic contexts, which naturally raises anxiety, it may indicate why student's who are considered to have 'higher' metacognitive ability appear to exhibit lower levels of 'trait' anxiety overall as, due to their level of competence, they may have a positive view of their own abilities and their academic performance; showing a greater a sense of self worth and fewer anxious traits (Dweck, 2000). However, such findings are merely sub components of the wider, original aim and therefore require further exploration as it may be plausible student's with 'higher' metacognitive ability attribute notions, such as self worth and anxiety, to academic performance but actually feel that a greater expectation is required of them, thus heightening these elements (Pelham, 1995). In any light, further exploration around such areas was required from a wider perspective, relating to the second aim of the study.

Qualitative Perspective

In regards to the second aim of this research, specifically how the university experience is perceived first hand by such students, first and foremost it is important to note that the context appeared intrinsic when considering how individuals perceive their experiences day to day as meaning-making individuals. In this light, how student's perceived the university experience appeared to be highly contextualized by who they were, and by the environmental context in which they experienced such issues. Firstly when considering the meaning of learning to students, influences from proximal interactions (family, friends and education) could be seen throughout, particularly contributing to the development and arguably changing identity for student's at university. In this way, methods or approaches that student's consequently chose to adopt for learning in recent and previous years appeared to be inherent to their immediate environments, in which ultimately contributed to a change or sense of 'fluidity' in identity within higher education; heightened during the first few years of university (Dunlosky and Lipko, 2007). Such

findings throughout the experiences of undergraduate students may point to similar expressions found within the emergent identities of postgraduate students whilst they negotiate the multiple and interacting practices in their transition to study (Tobbell and O'Donnell, 2013). To fully explore the notion of identity emerging as a developmental element, this indicates additional research, possibly from a Communities of Practice approach, may prove useful for further study as this often includes groups of people who come together to share skills knowledge or abilities (Lave and Wenger, 1991).

However, in regards to other elements that appeared prominent in this research, when considering factors that contributed towards or influenced on learning, particular attention was found in the role of wider influences, such as those found within the macro-system (e.g. cultural values, political policies and ideology), due to the notion that most of the students found the experience and facilitation of educational techniques to favour testing environments and grading systems, above the experience of the actual learner themselves (Bronfenbrenner, 1994). With the additional influence from the chronosystem, (e.g. the impact of influences over time), light was shed on how student's appeared to exercise increased freedom of choice and opportunity in their learning progression, however that this also led to increased pressure to pursue and maintain educational gain or achievement as a 'bare minimum' due to higher education becoming more of a normality in recent generations, the concept of being 'successful' therefore regarded as something different within education in contrast to previous decades.

Such findings arguably call attention to the current educational system and the academy itself, as with a new generation of students arguably showing their own language for factors such as identity, success, anxiety, what elements are such systems putting in place to help students progress within education, or cope throughout the learning experience. One may argue that the focus on assessment and testing environments within education has not changed significantly over previous decades, with an academy preference for white, middle-class, second-generation students still being visible today (Wilder et al., 2013). Such elements appear interesting when compared with the finding that irrelevant of age, the highest anxiety level in this research appeared to be reported by a participant of an ethnic minority group. Whilst this finding may have been due to a wide array of factors, a contradiction becomes apparent nonetheless as on the surface the ethos of the academy appears to promote learning as 'for the enjoyment of learning', however when considering actual experiences of learning from current generations of students this may not always be the case.

Conclusions

In conclusion, it can be argued that a combined insight to the phenomenon of metacognition in addition to the first hand experience of students throughout learning would not have emerged through the conventions of quantitative or qualitative data in their own respective fields. The power of a mixed methodology and convergent parallel design in this research therefore fell within the exploration around metacognitive phenomena within a population alongside the lived experiences of individuals experiencing this phenomenon and how they perceived learning amongst influences from within an individual's immediate and larger environment. Despite this, it cannot always be possible or practicable for a mixed methods design to showcase all elements important to both quantitative methods (such as reliability, validity, generalizability and credibility) and qualitative methods (such as internal validity, external validity, reliability and objectivity) alike (Ivankova and Wingo, 2018). However, in the context of the present research, combining the two approaches can be argued to have produced a better understanding of research problems than either approach could present alone, producing transferable results (Razali et al., 2019).

In this light, the main findings appear to extend on existing literature suggesting that metacognitive awareness is important to consider within education, enhancing elements such as critical thinking ability and self regulatory processes during learning (Rhodes, 2019). However, also since we also cannot separate or measure elements of learning away from individual and the social and cultural world that they inhabit, that the socio-cultural context was of importance to consider as learners appear contextualized by who they are and wider influences. Finally if it appears that students are living in a world where significant and meaningful change cannot be seen within education or is not reflected within the academy itself then factors, such academic competence being used to determine self worth or success, anxiety, and fluidities in identity during transition to higher education, may be considered the 'norm' for individuals in today's learning environment. What these findings have revealed is that more attention could be made to the learner's community when considering environments for a creating a 'successful' learner identity, highlighting possible relevance for Communities of Practice theories (Lave and Wenger, 1991). It also follows that it may be prudent within further research, possibly utilising advantages from a mixed method approach, to explore such issues further in regards to how these elements may exist within the changing times of recent events, e.g. the Coronavirus pandemic, in order to truly capture the essence of the learning experience within education today.

References

Abele, A.E. and Spurk, D. (2009), How do objective and subjective career success interrelate over time?. Journal of Occupational and Organizational Psychology, 82: 803-824. https://doi.org/10.1348/096317909X470924

Abrami, P. C., Bernard, R. M., Borokhovski, E., Waddington, D. I., Wade, C. A., & Persson, T. (2015). Strategies for teaching students to think critically: A meta-analysis. Review of Educational Research, 85(2), 275-314.

Alison Lawson (2014) Learner identities in the context of undergraduates: a case study, Educational Research, 56:3, 343-356, DOI: 10.1080/00131881.2014.934557

Allen, M. (2017). The sage encyclopedia of communication research methods (Vols. 1-4). Thousand Oaks, CA: SAGE Publications, Inc doi: 10.4135/9781483381411

Alloway, T. P., Banner, G. E. & Smith, P. (2010). Working memory and cognitive style in adolescents' attainment. *British Journal of Education Psychology, 80*, 567–581.

Anderson, D., & Thomas, G. P. (2014). 'Prospecting for metacognition'in a science museum: A metaphor reflecting hermeneutic inquiry. Issues in Educational Research, 24(1), 1.

Anderson, G. E., Whipple, A. D., & Jimerson, S. R. (2002). Grade retention: Achievement and mental health outcomes. National Association of School Psychologists, 1-4.

Anderson, L. W., & Krathwohl, D. R. (Eds.) (2001). A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives . New York: Addison Wesley Longman, Inc.

Andreassen, C., & Waters, H. S. (1989). Organization during study: Relationships between metamemory, strategy use, and performance. Journal of Educational Psychology, 81(2), 190–195. https://doi.org/10.1037/0022-0663.81.2.190

Apaydin, M., & Hossary, M. (2017). Achieving metacognition through cognitive strategy instruction. International Journal of Educational Management.

Ashiabi, G. S., & O'Neal, K. K. (2015). Child Social Development in Context: An Examination of Some Propositions in Bronfenbrenner's Bioecological Theory. SAGE Open. https://doi.org/10.1177/2158244015590840

Ben-David, A., & Orion, N. (2013). Teachers' voices on integrating metacognition into science education. International Journal of Science Education, 35(18), 3161-3193.

Berzonsky, M. D., & Kuk, L. S. (2000). Identity Status, Identity Processing Style, and the Transition to University. Journal of Adolescent Research, 15(1), 81–98. https://doi.org/10.1177/0743558400151005

Bian, H. (2018). Office for Faculty Excellence. Mixed Methods Research, Accessed from https://www.scribd.com/document/216825927/Mixed-Methods-Research [Accessed June 10, 2018].

Boulware-Gooden, R., Carreker, S., Thornhill, A., & Joshi, R.M. (2007). Instruction of Metacognitive Strategies Enhances Reading Comprehension and Vocabulary Achievement of Third-Grade Students. The Reading Teacher, 61 (1), 70-77. doi: 10.1598/RT.61.1.7.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3 (2), 77-101. doi: 10.1191/1478088706qp063oa.

Bronfenbrenner, U. (1979). The ecology of human development. Harvard university press.

Bronfenbrenner, U. (1994). Ecological models of human development. Readings on the Development of Children, 2 (1), 37-43. Retrieved from http://www.psy.cmu.edu/%7Esiegler/35bronfebrenner94.pdf.

Bronfenbrenner, U. (1994). Ecological models of human development. In Husen, T., Postlethwaite, T. N. (Eds.), International encyclopedia of education (2nd ed., Vol. 3, pp. 1643-1647). Oxford, UK: Pergamon Press.

Brown, A. L., Bransford, J. D., Ferrara, R. A., & Campione, J. C. (1983). Learning, remembering, and understanding. In J. H. Flavell, & M. E. Markman (Eds.), Handbook of Child Psychology (4th ed., Vol. III, Cognitive Development, pp. 77±166). New York: Wiley.

Brown, T. (2004). Critical thinking and learning: An encyclopedia for parents and teachers: Bloom's taxonomy and critical thinking. Westport: Greenwood Press.

Carley, S, "Educational theories you must know. Communities of Practice. St.Emlyn's.," in St.Emlyn's, November 4, (2015). https://www.stemlynsblog.org/better-learning/educational-theories-you-must-know-st-emlyns/educational-theories-you-must-know-communities-of-practice-st-emlyns/.

Cassady, J.C. (2004). The influence of cognitive test anxiety across the learning–testing cycle.

Learning and Instruction, 14 , 569-592. Retrieved from https://www.journals.elsevier.com/learning-and-instruction.

Cohen J. (1988). Statistical Power Analysis for the Behavioral Sciences. New York, NY: Routledge Academic

Colthorpe, K., Sharifirad, T., Ainscough, L., Anderson, S., & Zimbardi, K. (2018). Prompting undergraduate students' metacognition of learning: implementing 'meta-learning'assessment tasks in the biomedical sciences. Assessment & Evaluation in Higher Education, 43(2), 272-285.

Covington, M. V. (2000). Goal theory, motivation and school achievement. Annual review of Psychology, 51, 171-200.

Creswell, J. W. (2013). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.

Crocker, J., Karpinski, A., Quinn, D. M., & Chase, S. (2003). When grades determine self-worth: Consequences of contingent self-worth for male and female engineering and psychology majors. Journal of Personality and Social Psychology, 85, 507–516.

Crocker, Jennifer & Luhtanen, Riia & Cooper, Mary & Bouvrette, Alexandra. (2003). Contingencies of Self-Worth in College Students: Theory and Measurement. Journal of personality and social psychology. 85. 894-908. 10.1037/0022-3514.85.5.894

De Blume, A. P. G., Wells, P., Davis, C. A., & Parker, J. (2017). " You Can Sort of Feel It": Exploring Metacognition and the Feeling of Knowing among Undergraduate Students. The Qualitative Report, 22(7), 2016.

De Waard, D. (1996). The measurement of drivers' mental workload. s.n.

Delaney, Liam & Harmon, Colm & Redmond, Cathy. (2010). Parental Education, Grade Attainment & Earnings Expectations among University Students. Geary Institute, University College Dublin, Working Papers. 30. 10.1016/j.econedurev.2011.04.004.

Delavar, B., Dolatshahi, B., Nouri, M., & Aryanfar, K. (2014). Metacognition and Depression, State Anxiety and Trait Anxiety Symptoms. Practice in Clinical Psychology, 2, 195-200.

Dragan, M., Dragan, W., Kononowicz, T. and Wells, A. (2012). On the relationship between temperament, metacognition, and anxiety: independent and mediated effects. Anxiety, Stress & Coping, 25(6), pp.697-709.

Dunlosky, J., & Lipko, A. R. (2007). Metacomprehension: A brief history and how to improve its accuracy. Current Directions in Psychological Science, 16(4), 228–232.

Dunoyer, L.D. (2018). Metacognitive Awareness of Reading Strategies Inventory (MARSI).

Dye, K. M., & Stanton, J. D. (2017). Metacognition in upper-division biology students: Awareness does not always lead to control. CBE—Life Sciences Education, 16(2), ar31.

Efklides, A., Kourkoulou, A., Mitsiou, F. et al. Metacognitive knowledge of effort, personality factors, and mood state: their relationships with effort-related metacognitive experiences. Metacognition Learning 1, 33–49 (2006).

Elliott, T. R., Shewchuk, R. M., & Richards, J. S. (2001). Family caregiver social problem-solving abilities and adjustment during the inital year of the caregiving role. Journal of Counseling Psychology, 48(2), 223–232. https://doi.org/10.1037/0022-0167.48.2.223

Ericsson, K. A., & Simon, H. A. (1993). Protocol analysis: Verbal reports as data (2nd ed.). Cambridge, MA: MIT Press.

Ericsson, K.A., & Simon, H.A. (1993). Protocol anabsis (Revised edition). Cambridge, MA: MIT Press/Bradford.

Garrison, D. & Akyol, Zehra. (2014). Toward the development of a metacognition construct for communities of inquiry. The Internet and Higher Education. 17. 84–89. 10.1016/j.iheduc.2012.11.005.

Garrison, D. R., & Akyol, Z. (2015). Toward the development of a metacognition construct for communities of inquiry. The Internet and Higher Education, 24, 66-71.

Gaviria, C. (2019). Think about history with desire: metacognition, motivation and historical understanding. Colombian Journal of Psychology, 28, 147-163. https://doi.org/10.15446/rcp.v28n1.70763

Ghafoor, H., Ahmad, R. A., Nordbeck, P., Ritter, O., Pauli, P., & Schulz, S. M. (2019). A cross-cultural comparison of the roles of emotional intelligence, metacognition, and negative coping for health-related quality of life in German versus Pakistani patients with chronic heart failure. British journal of health psychology, 24(4), 828-846.

Gidron Y. (2013) Trait Anxiety. In: Gellman M.D., Turner J.R. (eds) Encyclopedia of Behavioral Medicine. Springer, New York, NY

Gill, O. and Jack, G. (2007) The child and family in context. Developing ecological practice in disadvantaged communities. Lyme Regis: Russell House Publishing.

Greene, J., Cohen, D., Siskowski, C., & Toyinbo, P. (2017). The relationship between family caregiving and the mental health of emerging young adult caregivers. The Journal of Behavioral Health Services & Research, 44(4), 551-5663. doi: 10.1007/s11414-016-9526-7

Halpern, D. F. (1989). Thought and knowledge: An introduction to critical thinking. Hillsdale: Lawrence Erlbaum Associates.

Hartman, H. J. (2001). Developing students' metacognitive knowledge and skills. In Metacognition in learning and instruction (pp. 33-68). Springer, Dordrecht.

Haryani, S., Wijayati, N., & Kurniawan, C. (2018). Improvement of metacognitive skills and students' reasoning ability through problem-based learning. JPhCS, 983(1), 012174.

Hassan, K., & Madhum, G. (2007). Validating the Watson Glaser Critical Thinking Appraisal. Higher Education, 54(3), 361-383. Retrieved April 5, 2021, from http://www.jstor.org/stable/29735117

Hauenstein, A. D. (1998). A New Conceptual Framework for Educational Objectives . Lanham, MD: University Press of America.

Hill, B. D., Alosco, M., Bauer, L., & Tremont, G. (2012). The relation of executive functioning to CVLT-II learning, memory, and process indexes. *Applied Neuropsychology: Adult, 19*, 198-206.

Huber, C. R., & Kuncel, N. R. (2016). Does college teach critical thinking? A meta-analysis. Review of Educational Research, 86(2), 431-468.

Irak, M., & Tosun, A. (2008). Exploring the role of metacognition in obsessive--compulsive and anxiety symptoms. Journal of anxiety disorders, 22(8), 1316–1325.

Ivankova, N., & Wingo, N. (2018). Applying mixed methods in action research: Methodological potentials and advantages. American Behavioral Scientist, 62(7), 978-997.

Julian L. J. (2011). Measures of anxiety: State-Trait Anxiety Inventory (STAI), Beck Anxiety Inventory (BAI), and Hospital Anxiety and Depression Scale-Anxiety (HADS-A). Arthritis care & research, 63 Suppl 11(0 11), S467–S472. https://doi.org/10.1002/acr.20561

Kennedy, M., Fisher, M. B., & Ennis, R. H. (1991). Critical thinking: Literature review and needed research. Educational values and cognitive instruction: Implications for reform, 2, 11-40.

King, N. (2004). Using templates in the thematic analysis of text In C. Casssell & G. Symon (Eds.), Essential guide to qualitative methods in organizational research (pp. 256-270).

Ku, K.Y.L. & Ho, I.T. (2010). Metacognitive strategies that enhance critical thinking. Metacognition Learning, 5 , 251-267. doi: 10.1007/s11409-010-9060-6.

Kuhn, D., & Dean, D. (2004). Metacognition: a bridge between cognitive psychology and educational practice. *Theory into Practice, 43*, 268–274.

Lave, J. and E. Wenger (1991). Situated learning: Legitimate peripheral participation. Cambridge, Cambridge University Press.

Longo, L. (2018). On the Reliability, Validity and Sensitivity of Three Mental Workload Assessment Techniques for the Evaluation of Instructional Designs: A Case Study in a Third-level Course. In CSEDU (2) (pp. 166-178).

Love, S., Kannis-Dymand, L., & Lovell, G. P. (2018). Metacognitions in triathletes: Associations with attention, state anxiety, and relative performance. Journal of Applied Sport Psychology, 30(4), 421-436.

Luckey, G. M. (2003). Critical thinking in colleges and universities: A model. In D. Fasko (Ed.), Critical thinking and reasoning (pp. 253–271). Cresskill: Hampton Press.

Magno, C. Metacognition Learning (2010) 5: 137. https://doi-org.libaccess.hud.ac.uk/10.1007/s11409-010-9054-4

Mangels, J. A., Butterfield, B., Lamb, J., Good, C., & Dweck, C. S. (2006). Why do beliefs about intelligence influence learning success? A social cognitive neuroscience model. Social cognitive and affective neuroscience, 1(2), 75-86.

Matthews, G., Hillyard, E. J., & Campbell, S. E. (1999). Metacognition and maladaptive coping as components of test anxiety. Clinical Psychology & Psychotherapy: An International Journal of Theory & Practice, 6(2), 111-125.

Mayer, R.E. (1998). Cognitive, metacognitive, and motivational aspects of problem solving. Instructional Science, 26 , 49-63. Retrieved from http://rhartshorne.com/fall-2012/eme6507-rh/cdisturco/eme6507-eportfolio/documents/Mayer%201998.pdf.

McCormack, D. (2013), Refrains for Moving Bodies: Experience and Experiment in Affective Spaces , Duke University Press, Durham, NC.

Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. Journal of Educational Psychology, 94(2), 249-259. doi:http://dx.doi.org.libaccess.hud.ac.uk/10.1037/0022-0663.94.2.249

Mokhtari, K., & Reichard, C. (2002). Metacognitive awareness of reading strategies inventory. Teaching Exceptional Children, 34(2), 29-34.

Mokhtari, Kouider & Dimitrov, Dimiter & Reichard, Carla. (2018). Revising the Metacognitive Awareness of Reading Strategies Inventory (MARSI) and testing for factorial invariance. Studies in Second Language Learning and Teaching. 8. 219-246. 10.14746/ssllt.2018.8.2.3.

Nash-Ditzel, S. (2014). Metacognitive Reading Strategies Can Improve Self-Regulation. Journal of College Reading and Learning, 40 (2), 45-63. doi: 10.1080/10790195.2010.10850330.

Negretti, R. (2012). Metacognition in Student Academic Writing: A Longitudinal Study of Metacognitive Awareness and Its Relation to Task Perception, Self-Regulation, and Evaluation of Performance. Written Communication, 29(2), 142–179. https://doi.org/10.1177/0741088312438529

Ning, H. K. (2016). Examining heterogeneity in student metacognition: A factor mixture analysis. Learning and Individual Differences, 49, 373-377.

Nordahl, H., Hjemdal, O., Hagen, R., Nordahl, H. M., & Wells, A. (2019). What lies beneath trait-anxiety? Testing the self-regulatory executive function model of vulnerability. Frontiers in psychology, 10, 122.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. International Journal of Qualitative Methods. https://doi.org/10.1177/1609406917733847

Paiva, D. (2016). Assessing sonic affects in everyday life: looking for metacognition and metaemotion. Qualitative Research Journal.

Pelham, B. W. (1995). Self-investment and self-esteem: Evidence for a Jamesian model of self-worth. Journal of Personality and Social Psychology, 69(6), 1141.

Pintrich, P. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. Theory into Practice, 41(4), 219–225.

Razali, F. M., Aziz, N. A. A., Rasli, R. M., Zulkefly, N. F., & Salim, S. A. (2019). Using Convergent Parallel Design Mixed Method to Assess the Usage of Multi-Touch Hand Gestures Towards Fine Motor Skills Among Pre-School Children. International Journal of Academic Research in Business and Social Sciences, 9(14), 153–166.

Reay, D., G. Crozier, and J. Clayton. 2009. "'Fitting In' or 'Standing Out': Working-class Students in UK Higher Education." British Educational Research Journal. IFirst Article: 1–18.

Rhodes, M. G. (2019). Metacognition. Teaching of Psychology, 46(2), 168-175.

Richmond, L., Redick, T.S., & Braver, T.S. (2016). Remembering to prepare: the benefits (and costs) of high working memory capacity. Journal of Experimental Psychology, Learning, Memory and Cognition, 1-27.

Rosa, E.M. and Tudge, J. (2013) 'Urie Bronfenbrenner's theory of human development: its evolution from ecology to bioecology', Journal of Family Theory and Review, 5(4), pp. 243–58.

Rust, J. (2002). Watson Glaser Critical Thinking Appraisal UK Edition-M anual. London: The Pschychological Corporation.

Schoen, D. (1983). The reflective practitioner. San Francisco: Jossey-Bass.

Schraw, G. (1998). Promoting general metacognitive awareness. Instructional science, 26(1-2), 113-125.

Snyder, M., & Dringus, L. (2014). An exploration of metacognition in asynchronous student-led discussions: A qualitative inquiry. Online Learning Journal, 18(2).

Spada, M. M., & Moneta, G. B. (2014). Metacognitive and motivational predictors of surface approach to studying and academic examination performance. Educational Psychology, 34(4), 512-523.

Spada, M. M., Georgiou, G. A., & Wells, A. (2009). The relationship among metacognitions, attentional control, and state anxiety. Cognitive behaviour therapy, 39(1), 64-71.

Spada, M. M., Nikcevic, A. V., Moneta, G. B., & Ireson, J. (2006). Metacognition as a mediator of the effect of test anxiety on a surface approach to studying. Educational

Psychology, 26(5), 615-624.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). State-trait anxiety inventory for adults. Mind Garden.

Tarricone, P. (2011). The taxonomy of metacognition. ProQuest Ebook Central https://ebookcentral.proquest.com

Thomas, G. P. (2009, August). Interpretive and mixed methods approaches to metacognition research: Providing context. Paper presented at the SIG 16 (Metacognition) Invited Symposium at the conference of the European Association for Research on Learning and Instruction, Amsterdam, The Netherlands.

Tobbell, Jane & O'Donnell, Victoria. (2013). Transition to postgraduate study: postgraduate ecological systems and identity. Cambridge Journal of Education. 43. 10.1080/0305764X.2012.749215.

Vignoles V.L. (2011) Identity Motives. In: Schwartz S., Luyckx K., Vignoles V. (eds) Handbook of Identity Theory and Research. Springer, New York, NY. https://doi.org/10.1007/978-1-4419-7988-9_18

Watson, G. B., & Glaser, E. M. (1961). Watson-Glaser critical thinking appraisal, Form Yn, Harcourt, Brace & World.

Watson, G., & Glaser, E. (2002). Watson-Glaser Critical Thinking Appraisal, UK Edition: Practice Test. Psychological Corporation.

Weinert, F. E. (1987). Introduction and overview: Metacognition and motivation as determinants of effective learning and understanding. In F. E. Weinert & R. H. Kluwe (Eds.), Metacognition, motivation and understanding. Hillsdale: Lawrence Erlbaum Associates, Publishers.

Weinert, F. E. (1987). Introduction and overview: Metacognition and motivation as determinants of effective learning and understanding. In F. E. Weinert & R. H. Kluwe (Eds.)

Wells, A. and Matthews, G. (1994).Attention and Emotion:A Clinical Perspective. Hove: Erlbaum.

Widyanti, Ari & Johnson, Addie & Waard, Dick. (2013). Adaptation of the Rating Scale Mental Effort (RSME) for use in Indonesia. International Journal of Industrial Ergonomics. 43. 70–76. 10.1016/j.ergon.2012.11.003.

Wilder, J., Jones, T. B., & Osborne-Lampkin, L. T. (2013). A profile of Black women in the 21st century academy: Still learning from the “Outsider-Within”. Journal of Research Initiatives, 1(1), 5.

Yang, C. T., & Lee, S. Y. (2013). The Effect of Instruction in Cognitive and Metacognitive Strategies on Nonth-Grade Students' Metacognitive Abilities. New Waves-Educational Research & Development, 16(1).

Yüksel, İ., & Yüksel, İ. (2012). Metacognitive Awareness of Academic Reading Strategies. Procedia - Social And Behavioral Sciences, 31, 894-898

Zijlstra, F.R.H., 1993. Efficiency in work behavior. A design approach for modern tools. PhD thesis, Delft University of Technology, Delft University Press, Delft, The Netherlands

Appendix

Appendix A

Amended questions from Watson and Glaser's (1961) Critical Thinking Appraisal.

Test 1: Inference

Directions:

An inference is a conclusion which a person draws from certain or supposed facts. For example, from the light behind the curtains or the sound of music in a house, a person might infer that someone is at home. However this inference may or may not be correct. Possibly the people in the house went out leaving the lights on, and the music may have been coming from a radio or television. In this test, each exercise begins with a statement of facts, which you are to regard as 'true'. After each statement of facts you will find several possible inferences, e.g. conclusions that a person might take from the stated facts. Examine each one and decide its degree of truth.

For each inference you will have the following options to answer with:
TRUE – if you think the inference is definitely TRUE; that is properly follows beyond a reasonable doubt from the statement of facts give.
PROBABLY TRUE - if, in the light of the facts given, you think the inference is PORBBLY TRUE; that there is better than an even chance that it is true.
INSUFUCIENT DATA – if you decide that there are INSUFFICICENT DATA that you cannot tell from the facts given whether the inference is likely to be true or false; if the facts provide no basis for judging one way or another.
PROBABLY FALSE – if, in the light of the facts given, you think the inference is PROBABLY FALSE; that there is better than an even chance that it is false.
FALSE – if you think the inference is definitely FALSE; that it is wrong, either because it misinterprets the facts given, or because it contradicts the facts or necessary inferences from those facts.

Read the passages below and decide from the following inferences which ones are True, Probably True, Insufficient Data, Probably False and False.
'An English teacher arranged for the students in one of her regular classes to see the film *Great Expectations*, while the students in all her other English classes studied the book instead of seeing the picture. She wanted to know whether films could be used as effective aids in teaching literature. Tests to check on appreciation and understanding of the story were given immediately after each type of instruction. On all tests the class that saw the film did better. This class became so interested in the story that most students chose to read the book after term ended, entirely on their own initiative. The teacher felt gratified over her experiment.'

1. The rests to measure appreciation and understanding of the sotry were administered both to the students who saw the film and to those who only studied the book.
2. The students who were taught with the aid of the film were required to read the book at the beginning of term.
3. No other English teacher who might try a similar experiment with her students would get similar results.

4. The teacher who conducted the study will (if she continues to teach literature) continue to use suitable films as teaching aids when she can.
5. Upon completion of the two forms of instruction, there was no evidence that the class who has seen the film appreciated or understood *Great Expectations* more than the classes which read the book without first seeing the film.
6. Students can learn ore about most subjects from films than they can from books.

'The first newspaper in America, edited by Ben Harris, appeared in Boston on the 25th September 1690, and was banned on the same day by governor Simon Bradstreet. The editor's subsequent long fight to continue his little paper and print what he wished marks an important episode in the struggle to maintain a free press.

17. The editor of the first American newspaper died within a few days after his paper was banned on the 25th September 1690.
18. A copy of the first issue of Ben Harris' newspaper was promptly brought to Governor Bradstreet's attention.
19. The editor of this paper wrote articles criticizing Governor Bradstreet.
20. Ben Harris was a man of persistence in holding to some of his interests or aims.

Test 2: Recognition

Directions:

An assumption is something presupposed or taken for granted. For example, when someone states, "I'll graduate in June", he takes for granted or assumes that he will be alive in June, the school will grant him permission to graduate in June and similar things.

Below are a number of statements. Each statement is followed by several proposed assumptions. You are to decide for each whether the person making an assumption in these statements is taking it for granted, justifiably or not. In some cases there may be more than one assumption necessarily made; in others there may be none.

Assumption Made – if you think the given assumption is taken for granted in the statement.

Assumption Not Made – if you think the assumption is not necessarily taken for granted in the statement.

Statement: 'A wise person will save at least twenty pounds each week out of their savings'

21. No fools have enough sense to save twenty pounds a week.
22. A person needs to be wise in order to save twenty pounds a week.

Statement: 'Let us immediately build superior armed forces and therefore keep peace and prosperity'

23. The building of superior armed forces guarantees the maintenance of peace and prosperity.

24. Unless we increase our forces we shall have war immediately.
25. We now have peace and prosperity.

Statement: 'The discovery of additional ways of using atomic energy will, in the long run, prove a blessing to mankind'
28. Atomic energy can have numerous uses.
29. The discovery of additional uses for atomic energy will require large long-term investments of money.
30. The present uses of atomic energy are a curse to mankind.

Statement: 'Since more and more students plan to go to college, many new university buildings must be constructed'
34. The number of university buildings to be constructed needs to be related to the plans of high school students regarding further education.
35. Existing university buildings are already crowded to capacity.
36. Attendance of students in university requires that buildings be available for them.

Test 3: Deduction

Directions: In this test, each exercise consists of two statements followed by several suggested conclusions. For the purpose of this test, consider the statements as TRUE and decide if the conclusions below necessarily follow them. Try not to let your prejudices influence your judgement. The word 'some' in these statements refers to part of, or maybe all of things, e.g. 'some holidays are rainy' meaning possibly more than one-perhaps even all holiday are rainy.

Conclusion Follows – if you think the conclusion necessarily follows from the statement given.
Conclusion Does Not Follow- if you think that it is not a necessary conclusion from the given statement.

Statement: 'If a person is superstitious, he believes in fortune-tellers. Some people do not believe fortune-tellers. Therefore… '
40. If a person is not superstitious, he will not believe fortune-tellers.
41. Some people are not superstitious.
42. If a person believes fortune-tellers, they are superstitious.

Statement: 'All good athletes are in fine physical condition. Some good athletes have poor scholastic records. Therefore…'
53. Some people with poor scholastic records are in fine physical condition.
54. If a person is in fine physical condition, he will have a poor scholastic record.
55. Some people in fine physical condition have poor scholastic records.
56. Every student who has a good scholastic record and is a good athlete is in fine physical condition.

Statement: 'All great novels are works of art. All great novels capture our imagination. Therefore…'
57. Whatever captures our imagination is a work of art.

58. Some works of art capture out imagination
59. Our imagination can be captivated by many different kinds of things.

Statement: 'No person with a substantial income can avoid paying income tax. Some people with a substantial income dislike paying income tax. Therefore…'
60. Some people with a substantial income must do things they dislike.
61. All people who pay income tax have a substantial income.

Test 4: Interpretation

Directions: Each exercise below consists of a short paragraph followed by several suggested conclusions. For the purpose of this test assume that everything in the short paragraph is TRUE. The problem is to judge whether or not each of the proposed conclusions logically follows beyond a reasonable doubt from the information given in the paragraph. In some cases, more than one of the suggested conclusions may follow.

Conclusion Follows – if you think the proposed conclusion follows beyond a reasonable doubt (even though it may not follow absolutely) from the paragraph.
Conclusion Does Not Follow- if you think the proposed does not follow beyond a reasonable doubt from the paragraph.

'Of the 2,800,000 students in the nation's public high schools during a certain year, only 830,000 were enrolled in science and mathematics courses.'
62. Some public high schools did not require science and mathematics for all students during the given year.
63. One major reason for the fact that about half of the high school's students did not study science and mathematics is that they took those courses in their earlier years at high school.
64. Some students in the nation's public high schools, during the year in question, were studying neither science nor mathematics.

'The history of the last 2000 years shows that wars have become steadily more frequent and more destructive, the twentieth century having the worst record so far on both these aspects.'
71. Mankind has not advanced much in the ability to keep peace.
72. Wars are bound to be more destructive as science provides more powerful weapons.
73. During the past 300 years, men have engaged in more frequent and more destructive wars than they did in any 300-year period since the year 1.

'Usually I fall asleep promptly, but about twice a month I drink coffee in the evening and whenever I do, I lie awake and toss for hours after I go to bed.'
74. My problem is mostly mental; I am over aware of the coffee when I drink it at night, anticipating that it will keep me awake and therefore it does.
75. I don't fall asleep promptly after drinking coffee at night because the caffeine stimulates my nervous system for several hours after drinking it.
76. Whatever causes me to lie awake and toss at night is associated with my drinking coffee earlier in the evening.

Test 5: Evaluation of Arguments

Directions: In making decisions about important questions, it is desirable to be able to distinguish between arguments that are strong and arguments that are weak, as far as the question at issue is concerned. An argument is weak if it is not directly related to the question, even though it may be of great general importance; or if it is of minor importance, or only related to trivial aspects of the question. Below is a series of questions, followed by several arguments. For the purpose of this test you are to regard each statement as TRUE and decide whether it is a strong or weak argument. Judge each one separately and try not to let your personal attitude towards the question influence your evaluation.

STRONG – if you think the argument is strong.
WEAK – if you think the argument is weak.
'Should the United States government try to keep the public informed of the details of its scientific research programs by publicising ahead of time the results which are hoped for from experimental tests of new weapons, equipment, devices etc.?'

89. No. Some people become critical of the government when widely publicised projects turn out unsuccessfully.
90. Yes. Only a public so informed will give the necessary support for the research and development activities essential to the nations security.
91. Yes. The projects are supported by taxes and the general public would like to know their money is to be spent.

'Can rich and poor people who happen to oppose each other at law obtain approximately equal justice from the courts when the cases are decided by jury trial?'
92. Yes. Lawyers for both sides have the opportunity to question prospective jurors about possible biases.
93. No. Most juries are more sympathetic to poor people in court battles when their opponents are known to be rich, and the juror's sympathies affect their findings.'
94. No. Rich people win their lawsuits against poor people a little more than poor people win against rich people.

'Should the United States government take over all the main industries in the country, employ all who want to work, and offer the products at cost price?'
95. No. So much concentration of economic and bureaucratic power in the government would undermine personal and political freedom.
96. Yes. The government already operates post offices, high ways, parks, military forces, public health services, and some other pubic services.
97. No. The subsequent elimination of competition and the profit motive would result in much less initiative for production of useful new goods and services.

Appendix B

Spielberger et al's., (1983) State- Trait Anxiety Inventory (STAI)

Y-1 DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, *at this moment.* There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat	Moderately So	Very Much So
1. I feel calm……..	**1**	**2**	**3**	**4**
2. I feel secure……..	**1**	**2**	**3**	**4**
3. I am tense……..	**1**	**2**	**3**	**4**
4. I feel strained…….	**1**	**2**	**3**	**4**
5. I feel at ease……..	**1**	**2**	**3**	**4**
6. I feel upset…….	**1**	**2**	**3**	**4**
7. I am presently worrying over possible misfortunes…….	**1**	**2**	**3**	**4**
8. I feel satisfied……	**1**	**2**	**3**	**4**
9. I feel frightened …….	**1**	**2**	**3**	**4**
10. I feel comfortable……	**1**	**2**	**3**	**4**
11. I feel self-confident…….	**1**	**2**	**3**	**4**
12. I feel nervous……..	**1**	**2**	**3**	**4**
13. I am jittery……	**1**	**2**	**3**	**4**
14. I feel indecisive…….	**1**	**2**	**3**	**4**
15. I am relaxed…….	**1**	**2**	**3**	**4**
16. I feel content……	**1**	**2**	**3**	**4**
17. I am worried…….	**1**	**2**	**3**	**4**
18. I feel confused…….	**1**	**2**	**3**	**4**
19. I feel steady…….	**1**	**2**	**3**	**4**
20. I feel pleasant……..	**1**	**2**	**3**	**4**

Y-2 DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	Almost Never	Sometimes	Often	Almost Always
21. I feel pleasant……..……....	**1**	**2**	**3**	**4**
22. I feel nervous and restless……...	**1**	**2**	**3**	**4**
23. I feel satisfied with myself……..……..	**1**	**2**	**3**	**4**
24. I wish I could be as happy as others seem to be…….	**1**	**2**	**3**	**4**
25. I feel like a failure……..	**1**	**2**	**3**	**4**
26. I feel rested……	**1**	**2**	**3**	**4**
27. I am “calm, cool, and collected”……..…….	**1**	**2**	**3**	**4**
28. I feel that difficulties are piling up so high that I cannot overcome them…...	**1**	**2**	**3**	**4**
29. I worry too much over something that doesn’t really matter……	**1**	**2**	**3**	**4**
30. I am happy……...……	**1**	**2**	**3**	**4**
31. I have disturbing thoughts…….	**1**	**2**	**3**	**4**
32. I lack self-confidence……...……..	**1**	**2**	**3**	**4**
33. I feel secure……	**1**	**2**	**3**	**4**
34. I make decisions easily……	**1**	**2**	**3**	**4**
35. I feel inadequate…….	**1**	**2**	**3**	**4**
36. I am content……	**1**	**2**	**3**	**4**
37. Some unimportant thought runs through my mind and bothers me…….	**1**	**2**	**3**	**4**
38. I take disappointments so keenly that I can’t put them out of my mind……	**1**	**2**	**3**	**4**
39. I am a steady person…….	**1**	**2**	**3**	**4**
40. I get in a state of tension or turmoil as I think over my recent concerns and interests……..	**1**	**2**	**3**	**4**

Appendix C

Metacognitive Awareness of Reading Strategies Inventory (MARSI); developed by Mokhtari and Reichard (2002)

DIRECTIONS: Listed below are statements about what people do when they read academic or school- related materials such as textbooks, library books, etc. Five numbers follow each statement (1, 2, 3, 4, 5) and each number means the following:

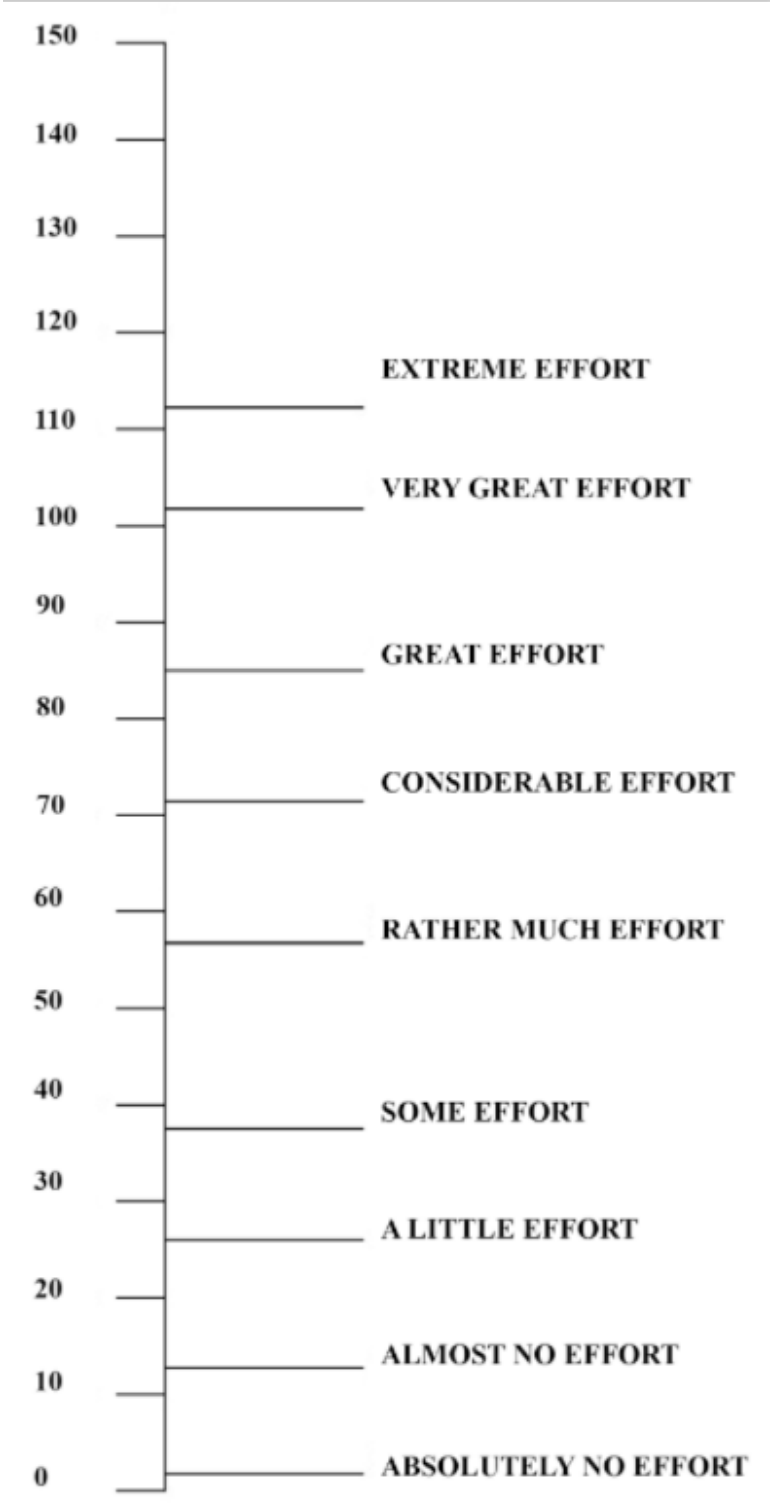
- **1 means "I never or almost never do this."**
- **2 means "I do this only occasionally."**
- **3 means "I sometimes do this." (About 50% of the time.)**
- **4 means "I usually do this."**
- **5 means "I always or almost always do this." After reading each statement, circle the number (1, 2, 3, 4, or 5) that applies to you using the scale provided. Please note that there are no right or wrong answers to the statements in this inventory.**

TYPE	STRATEGIES	SCALE				
GLOB	1. I have a purpose in mind when I read.	1	2	3	4	5
SUP	2. I take notes while reading to help me understand what I read.	1	2	3	4	5
GLOB	3. I think about what I know to help me understand what I read.	1	2	3	4	5
GLOB	4. I preview the text to see what it's about before reading it.	1	2	3	4	5
SUP	5. When text becomes difficult, I read aloud to help me understand what I read.	1	2	3	4	5
SUP	6.I summarize what I read to reflect on important information in the text.	1	2	3	4	5
GLOB	7. I think about whether the content of the text fits my reading purpose.	1	2	3	4	5
PROB	8. I read slowly but carefully to be sure I understand what I'm reading.	1	2	3	4	5
SUP	9.I discuss what I read with others to check my understanding.	1	2	3	4	5
GLOB	10. I skim the text first by noting characteristics like length and organization.	1	2	3	4	5
PROB	11. I try to get back on track when I lose concentration.	1	2	3	4	5

SUP	12. I underline or circle information in the text to help me remember it.	1	2	3	4	5
PROB	13. I adjust my reading speed according to what I'm reading.	1	2	3	4	5
GLOB	14. I decide what to read closely and what to ignore.	1	2	3	4	5
SUP	15. I use reference materials such as dictionaries to help me understand what I read.	1	2	3	4	5
PROB	16. When text becomes difficult, I pay closer attention to what I'm reading.	1	2	3	4	5
GLOB	17. I use tables, figures, and pictures in text to increase my understanding.	1	2	3	4	5
PROB	18. I stop from time to time and think about what I'm reading.	1	2	3	4	5
GLOB	19. I use context clues to help me better understand what I'm reading.	1	2	3	4	5
SUP	20. I paraphrase (restate ideas in my own words) to better understand what I read.	1	2	3	4	5
PROB	21. I try to picture or visualize information to help remember what I read.	1	2	3	4	5
GLOB	22. I use typographical aids like bold face and italics to identify key information.	1	2	3	4	5
GLOB	23. I critically analyze and evaluate the information presented in the text.	1	2	3	4	5
SUP	24. I go back and forth in the text to find relationships among ideas in it.	1	2	3	4	5
GLOB	25. I check my understanding when I come across conflicting information.	1	2	3	4	5
GLOB	26. I try to guess what the material is about when I read.	1	2	3	4	5
PROB	27. When text becomes difficult, I re-read to increase my understanding.	1	2	3	4	5
SUP	28. I ask myself questions I like to have answered in the text.	1	2	3	4	5
GLOB	29. I check to see if my guesses about the text are right or wrong.	1	2	3	4	5
PROB	30. I try to guess the meaning of unknown words or phrases.	1	2	3	4	5

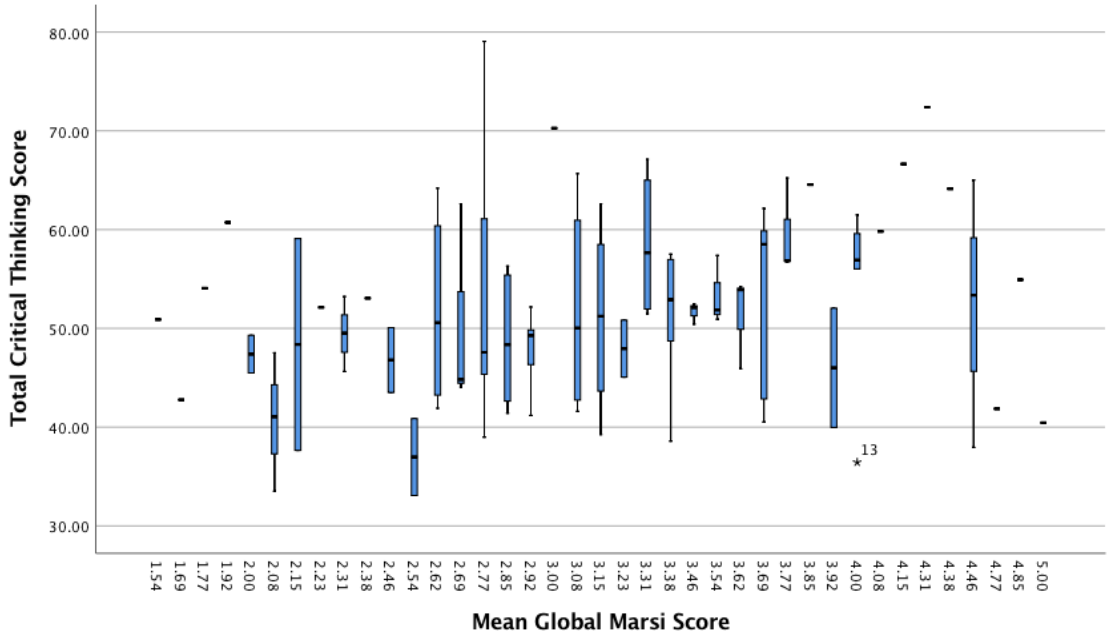
Appendix D

Ziljstra's (1993) Rating Scale of Mental Effort (RSME).



Appendix E

Example of SPPS output from Global Strategy/ Critical Thinking.



Appendix F

Example of SPPS output from Support Strategy.

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Total Critical Thinking Score	Based on Mean	.605	2	105	.548
	Based on Median	.579	2	105	.562
	Based on Median and with adjusted df	.579	2	99.272	.562
	Based on trimmed mean	.599	2	105	.551
Critical Thinking Inference Score	Based on Mean	.120	2	105	.887
	Based on Median	.108	2	105	.898
	Based on Median and with adjusted df	.108	2	104.740	.898
	Based on trimmed mean	.131	2	105	.877
Critical Thinking Assumption Score	Based on Mean	1.379	2	105	.256
	Based on Median	1.149	2	105	.321
	Based on Median and with adjusted df	1.149	2	103.638	.321
	Based on trimmed mean	1.389	2	105	.254
Critical Thinking Deduction Score	Based on Mean	.032	2	105	.968
	Based on Median	.079	2	105	.924
	Based on Median and with adjusted df	.079	2	104.301	.924
	Based on trimmed mean	.035	2	105	.965
Critical Thinking Interpretation Score	Based on Mean	.578	2	105	.563
	Based on Median	.376	2	105	.688
	Based on Median and with adjusted df	.376	2	103.042	.688
	Based on trimmed mean	.529	2	105	.591
Critical Thinking Argument Score	Based on Mean	1.793	2	105	.172
	Based on Median	1.670	2	105	.193
	Based on Median and with adjusted df	1.670	2	97.873	.193
	Based on trimmed mean	1.783	2	105	.173
State Anxiety Score	Based on Mean	1.119	2	105	.330
	Based on Median	1.106	2	105	.335
	Based on Median and with adjusted df	1.106	2	99.611	.335

	Based on trimmed mean	1.170	2	105	.314
Trait Anxiety Score	Based on Mean	1.931	2	105	.150
	Based on Median	1.854	2	105	.162
	Based on Median and with adjusted df	1.854	2	103.204	.162
	Based on trimmed mean	1.909	2	105	.153
Effort Score	Based on Mean	.193	2	105	.825
	Based on Median	.145	2	105	.865
	Based on Median and with adjusted df	.145	2	100.026	.865
	Based on trimmed mean	.202	2	105	.818

ANOVA

		Sum of Squares	df	Mean Square	F	Sig
Total Critical Thinking Score	Between Groups	193.741	2	96.871	1.178	
	Within Groups	8633.863	105	82.227		
	Total	8827.605	107			
Critical Thinking Inference Score	Between Groups	1.556	2	.778	.073	
	Within Groups	1121.111	105	10.677		
	Total	1122.667	107			
Critical Thinking Assumption Score	Between Groups	6.098	2	3.049	.309	
	Within Groups	1035.353	105	9.861		
	Total	1041.451	107			
Critical Thinking Deduction Score	Between Groups	29.945	2	14.973	.863	
	Within Groups	1822.088	105	17.353		
	Total	1852.033	107			
Critical Thinking Interpretation Score	Between Groups	50.152	2	25.076	1.003	
	Within Groups	2625.387	105	25.004		
	Total	2675.539	107			
Critical Thinking Argument Score	Between Groups	37.020	2	18.510	2.354	
	Within Groups	825.609	105	7.863		
	Total	862.628	107			
State Anxiety Score	Between Groups	52.241	2	26.120	.655	
	Within Groups	4184.167	105	39.849		
	Total	4236.407	107			
Trait Anxiety Score	Between Groups	67.167	2	33.583	.707	
	Within Groups	4987.083	105	47.496		
	Total	5054.250	107			
Effort Score	Between Groups	1116.222	2	558.111	.936	

	Within Groups	62627.778	105	596.455		
	Total	63744.000	107			

Appendix G

One example of a semi-structured interview transcript.

1. Question 1. Normally, I'd say that my levels of anxiety... erm, I'm quite a calm person so I'm not very anxious. Unless I'm taking part in a new activity. When I'm doing something new I get quite anxious before I- I do that. Erm... it's as if I'm worrying about what might happen erm... and I usually think it'll go the wrong way, which makes me more anxious.

2. I'd say I'm an anxious person for question two. Erm... and I always have been really. So, uh. For question two, I'd say that I am an anxious person and always have been. I worry a lot about doing new things for example... erm...

3. For question three. Situations that normally raise my anxiety, like I've said, they're all just new situations to me, things that I haven't done before, that... erm... that I think could be bad or might be hard for me to do, and I don't wanna do things wrong in front of other people, which could embarrass me or humiliate me, and then I end up being more an-anxious.

4. Question four. I felt slightly anxious completing the previous task and that's because... I haven't been at university for a while. So... so, you know all the... erm... quite scientific terms like cardiovascular and things like that erm... made me have to concentrate a lot more. Erm... but it wasn't very- it didn't make me very anxious... I wouldn't say.

5. For question five. I'd say in terms of education, erm... I get quite anxious when it comes to deadlines, especially if I've already got an extension. Erm... so I haven't got a chance of getting- extending my deadline. Erm... the workload can be quite heavy at times. Like I asked for an extension at one point and... because of that, it ended up making me have to do two essays within one week. So one thousand words and a two thousand word essay, both separate and I had to do them in one week. And it makes y- it only makes me anxious when it gets to the last two days I'd say... because I feel the pressure is on me then, I feel like I have to get it

done. But, uni life, I think... that doesn't make me anxious at all because we all commute we don't really see much of each other anyway. I just hang around with the people I hung around with before. Erm... but I see them all... I see all the people that I'm friends with at uni throughout the day and then we all go our separate ways in the night. So it's- it doesn't make me anxious at all really and we all contact each other outside of uni.

6. For Question 6. Normally when I get my grades back, I feel... erm, very anxious because I always feel like I'm going to do bad. Or that I won't do as well as I'd hoped, which... makes the whole situation a lot- a lot harder. Whereas if I just went into it thinking I'd done really well and didn't do as well as I thought erm... to be honest, I'd still probably anxious... erm.

7. For question seven. Mmmm. When I get a grade, when I get a grade back that I didn't expect... erm, if it's a good grade like better than I thought, I'd be really happy. Erm I'd be over the moon, to be honest. But if it's the grade that I didn't want, like worse than I should've got, I just feel really disappointed and in turn makes me worry about the next set of grades that I'm supposed to get. It- it can put me down sometimes.

8. For question 8. Erm... I'd say I've been alright, in terms of being successful with education. At GCSE's I mainly got C's and B's. Erm... and within first year of university I'm getting first's and 2:1's mostly, which I'm really happy about... so... that does make me happy. I feel like because it's a subject that I actually care about I haven't been forced to do it, as we choose to come to uni. Erm... I feel like that helps me to be successful... because I can put the time in and actually, enjoy writing essays about that subject, whereas doing geography at GCSE, for example, if you really didn't want to do that, you'd be forced too. Erm... so you, wouldn't really put as much effort in. So the fact I am successful, successful at uni in the first year, it feels like I deserved it and I earned it myself because I've put a lot more time in, staying up late to finish off essays, etc...

9. Question 9. I'd say I haven't always felt this way. Like I've said, it just depends on the subject. Now I've progressed through education and- and I've made it to uni,

I feel like... I've erm... it definitely has changed and I'm more successful now because I care about it, care about the subject, psycho- psychology.

10. Question 10. Erm, generally I'd- I'd say, well, I try to believe in myself, but when it comes to it, I- I worry a lot, I get anxious and tend to think that I might fail instead. Or at least do badly. Like I might come out of an exam, for example, thinking I've done worse than I should have or... I just haven't done well, when in reality I'll come out of the exam, when I see my results I'll have actually done well, or better than I thought, which is very surprising. You could say I'm pessimistic towards myself in that kind of sense, but I think it's just because I get anxious before I do exams so... I just worry about a lot of things.

11. Question 11. What makes me believe in myself is when someone, for example... things that make me believe in myself is when another person tells me I can do it or, they believe in me... and the- they're vocal about it... and say they think I'll be able to do well. Like if I've come out of an exam and I say 'aw I don't think I've done well this time', and they said to me, 'I reckon you've done well' or 'better than me' or something like that... I feel like... I can be a bit more happier and I can believe in myself then, for the future. So I might go into another exam then thinking 'last time I got told I did- I was gonna do all right, so this time I should be able to'. And then it helps me believe in myself and I get through things.

12. In terms of question twelve. I think, I do value myself... quite highly, but erm... as I said I'm quite pessimistic so I look towards like, the bad things, erm. So... I wouldn't- to be honest I wouldn't say I value myself enough. Erm... so only when someone else tells me that I'm worth it that... I'm happy about that kind of thing.

13. Question 13. I think others value me. Erm... cause I've got a lot of close friends who, for example, if I come off social media or don't text anyone for a bit, they actually start questioning straight away. Like if I don't text anyone in like a group chat, for example, erm... and I come back like two days later, I come back and see loads of questions saying 'where are you?, are you alright?' and things like that. And it shows the must value me in some sense because they actually care about me. Erm... so, and I think a lot of people who rely on me cause they say I'm like, like they can respect me because anyone tells me like a secret or something,

I'll keep it to me- keep it to myself... erm, and they can trust me if they need to say anything. Erm, so I'd say they do value me yeah.

14. For Question 14. I'd say... I kind of feel valued at university. Within my friends at university I'd say I would, I would be valued because... erm... because we can all work together on assignments and things, we get along and erm... and then we'll text each other if we get home about something that we need help with, for example. Where as uni itself... I don't feel that like we have a close enough relationship with any of the lecturers... to feel valued in that sense. Erm, the only people that you really talk to are your friends at uni and erm... like I've said I feel valued by them, so. I'd say yeah valued by the friends, but not really valued by any of the lecturers, or the university itself.

15. For question 15. To feel even more valued I think we'd need more - more one on one time with like lecturers. More seminars. If tea- if the lectures like knew your names erm... in seminars, I think that would make the whole university experience feel a lot more down to earth, a bit more personal, and therefore I'd feel a bit more valued. Whereas because we just never really see them in person... to us it's just like someone standing in front of a room and you never see them until next Monday for your 9am lecture, for example. And that's just, how I feel about it really.

16. For question 16. I'd say I put a lot of- a lot of effort into my university work. Sometimes I'll be staying up till 3am if I've got a deadline within two days. I'll stay until 3am to finish an essay because I want to make sure it's the best I can do. Erm... I put a lot more effort than I did at A Level because I didn't get the grades I wanted. Erm... but, like I've said I- already, I do care about psychology itself which is why I put more effort in. Erm... and I do enjoy it.

17. For question 17. I put this level in, like level of effort in, because I enjoy it. Erm... and I do want to get a good grade out of it in the end, because I want a good job. Erm... I'd love to be a psychologist or something along those lines something I can get- use the psychology out- use of psychology out of it because I find it that interesting and very useful. I can help others and, that's what I want to do.

18. Um, for question 18. I think... the last grade doesn't actually reflect how well you'll do in y- your next assignment because sometimes... you can be stressed and it, like... one weekend you might... you might be out and all the time you cou- and you don't have enough time to spend on that assignment. You come back and you just have to rush that assignment. But it doesn't mean you can't put more effort into the next one you do. Erm... so an-I don't think it does reflect how well you do in your next assignment if you do bad in like, your last one.

19. Question 19. How would you descirbe your identity? I'd say erm... I'm not really sure what the question means by that, but I'd say I'm... if I'm thinking of it in the right way, I'd say I'm like a hardworking person. Erm... I do feel very anxious when it comes to certain things. I don't like trying new things... erm unless I know that it's going to work out for me. Erm... erm... I'm a happy person, but... erm... oh (sighs).

20. Question 20. I think your identity can change as a student because... let's say I might, back in A Level, I might not have been as hardworking. But, now at university, I'd say I'm really hard working so I'd say it- it has changed. Erm... some people, I guess, could get more lazy like if they're in A Level and they really wanted to get into university they might have tried really hard. They might have got the A's they needed to get into university, but now they're here, they just lay back and wait till like the last day to start their assignments and then end up getting a grade they really didn't want. So I guess your identity can change. You could be a happy person going into university, but because of all the stress it can cause you, sometimes your identity could change and you could become more... erm... erm... more socially reserved I guess, because you might not want to go to see your friends anymore because you need to put the effort in erm... into university because you get, th- the workload is pretty high at some points. So you might have gone from being a pretty sociable person like last year, you come to university and... you're not sociable anymore because you need to stay in your room and do all your assignments. Erm... but yeah.

21. For question 21. I'd say what make- in terms of things that make up my identity, I'd say... erm... ahh I don- I like making people laugh and things erm.... erm... hmmm. I like- I like psychology itself, so I guess... in terms of my identity, I'm a

psychologist... erm I'm not really sure how to answer that question. Erm... I'm a happy, caring person that people can trust. Erm... yeah I- I'll leave it at that erm.

22. Question 22, are you aware of you're own identity? I'm not sure to be honest, since erm... I didn't really understand what it meant but I guess... erm... I guess I kind of do because I know- I know my own personality and things. Erm... yeah, like I- I know I'm hard working. So... when I get given a new assignment I know I'm gonna have to put that same level of effort into- into it.

23. Question 23. What would you say if I asked you what your academic identity looked like? Uh, for that question I would say... well, like I've said before, hardworking, erm. When it comes- when it comes down to things that I need to put effort into like, like if I want a good grade in something specific, I will put the time in, erm I won't lay back and I'll actually stay up late to get things done, erm... I mean sometimes I should try harder like, some people I know they'll stay in the library for hours on end, whereas I'm not really that bothered I'll- I'd rather come home and just work on things a bit at a time. So... I'd say in terms of my ac- academic identity. I like to work- work on things, bits at a time. Erm... but, even though I do I still would say I'm a hard worker.

24. Question 24. The reason I- I decided to come to university was because I really wanted to do psychology. Erm... and I knew that I could only do that through coming to university. You need to go down that university route in order to pursue psychology so... I guess that's why I chose it. Erm... I really en- erm... (stops).

25. For question 25, why did I decide to study psychology? The reason I chose that was because I did it. I only took it on a whim at- at A Level, but I really enjoyed it. Erm... I got on with the teachers well and it kind of like... worked out that way. Because I got on with the teachers and I enjoyed the subject really well, it made me... s- erm... take a lot- like put a lot more effort into the subject itself, and therefore because I'd put a lot more effort in, that was the best grade I got at A Level. It made me want to do psychology more. Erm... and I think psychology would be a very useful skill to have, I can help other people. Erm and there's lots

of jobs out there that I can use psychology as to help other people. So I feel like I'd be useful in society if I- if I took up tha- took up that job.

26. Question 26. In terms of life as a student... erm... my life hasn't really changed to be honest because I'm- I commute to university and I only live in Huddersfield anyway so it's not like the town itself has changed. It's not like I've moved from Manchester to Huddersfield, I've- I've been going to Huddersfield... every week. Well, I've always lived in Huddersfield, so... it's not changed in that aspect. All the friends that I've made at university commute. Most of them come from Manchester or Halifax so it's like, I don't really see them that much... unless we're at university. So it's not like... my life... as a student means... erm... I'm going out with them all the time and not seeing my- the friends I made before university, because I am. I'm seeing them, way more still.

27. For question 27. I'd say... erm learning is part of my life now, it's way more important than it has been before because, I am paying to do this now at university rather than just being forced to do at GCSE. It's like I have to take- I have to care about it now. So I have to take time out my day and do things- I have to do parts of my assignments and et-etc. I have to... get things done.

28. Erm, for question 28. I'd say... things that effect your experience of being a learner... erm... I guess one thing that would affect your experience of being a learner would be, just the fact that you've got to have that mentality, the personality that will make you want to work hard and succeed. Whereas if you're just really not bothered about university and you're not really bothered about learning, erm... like you feel like your parents are forcing you into doing it just because you have to erm... that will- that will affect your experience, cause you're not gonna care, you're not going to want to put the effort in and... you're not going to see the whole side of university, because you might choose to stay at home instead of going- going out to seminars or something, for example, like a lot of people seem to do. Or, coming to the university, come to have the lecture and then just leave. Erm... you've definitely got to have the right mindset to just... 'learn'. Erm... other things that effect your experience of being a learner... like... sleep is one of them. Like sleep is probably the main part. Erm... because if you're always tired, people are always falling asleep in the lectures I go to. Erm...

which is probably a big reason why they might not get the grades they want because they're not really listening to all the lectures they need. Another thing that effects your experience is, like lecture capture. A lot of people seem to rely on that. Like I've just said before, they'll sleep in lectures and then read or watch lecture capture after. So... erm... I guess lecturers themselves are quite... effected quite a lot cause if lectures are boring then people won't really care and they'll leave half way through. It's all about making things interesting, and that will definitely affect your experience as you'll actually care about what you're watching, care about like the lectures you're watching and taking part in. But yeah.

That's all the questions so I'd like to say thank you for taking- letting me take part in this. And once again, I do consent to take part in this study. Thank you.

Appendix H

Example of Thematic Analysis Codes.

Table 2.4 Four candidate themes from the child-freedom study, with example codes

Theme 1: A 'precarious identity'	*Theme 2: A 'perfectly good life'*	*Theme 3: Childfree position as marginalised*	*Theme 4: 'Not a maternal bone in my body'*
• Precarious identity position • Keeping options open (not getting sterilised) • Can't make decision for older self • Percentages for/against having children • Not always sure • Risk to relationship means rethinking childfree status • Twinges of regret, but never enough to want children • Wants grandchildren without the hard work of parenting • Balancing freedom of not having children/family with isolation of not having family/children	• Children as self-sacrifice • 'Perfectly good life' as free of children • Children ruin your life • Life cannot remain the same • Inevitable upending change • Anger over 'unfair' responsibility – looking after siblings when a child • Unrestricted freedom/ time/career options • Unmitigated freedom to be self • Time consuming hobbies open to childfree • Children are expensive by default • Choosing jobs easier as less ties • Children negatively affect intimacy • Loss of lifestyle more than gain from having a child	• Organising holidays is more expensive (package holidays are for families or the old) • Has to tolerate children's spaces for sake of relationships with friends • Childfree people expected to adapt to others' children even though chosen not to have children • 'Oh you'll change your mind' • Trouble getting sterilised • Explicit denial of stigma • Booked holidays 'usurped' by workmate with children • Not fitting in with friends whose identity is now focused on parenting • Being asked to take holidays at a different time to accommodate those with children	• Hard to fathom why anyone would want children • 'Lacks' the ingredients to do such a difficult task • Not an identity, a state • Sisters have 'something' she does not • External 'reminders' to have kids (i.e. friends getting pregnant) – not internal • No biological urge

Appendix I

Risk Analysis and Management Form.

THE UNIVERSITY OF HUDDERSFIELD: RISK ANALYSIS & MANAGEMENT

ACTIVITY:MRes Research Project Session			Name: Brittany Nockalls	
LOCATION: University of Huddersfield (session likely to be held in interview room).			Date: February 2019	Review Date:
Hazard(s) Identified	Details of Risk(s)	People at Risk	Risk management measures	Other comments
Interviewing the participants around slightly personal/sensitive themes	**Personal Wellbeing**	**Interviewees**	• **To have full consent before discussing such issues.** • **To have debrief sheet fully in place with lists of relevant helplines and contacts.** • **Having personal training in managing/ providing support in distressing situations**	**Specific interview arrangements and location will be identified with administrator/colleagues in advance of meeting.**
Loss/ theft of data	**Security of data**	**Interviewees**	• **Electronic data to be stored only on password secured university K-Drive computer equipment and storage devises.** • **Dictaphones with audio recordings to be transported in a lockable case and data deleted immediately after upload to computer.**	**Laptops, and other electronic data storage devices to be transport in the boot of a car.** **Participants will be informed of all GDPR requirements before taking part.**

Manual handling	**Personal wellbeing**	**Researcher**	• **To conduct session with consideration of personal health and well-being.** • **To familiarize self with support available.**	
Display screen equipment	**Poor posture sat working for prolonged periods resulting in musculoskeletal problems, visual/physical fatigue**	**Researcher**	• **All workstations subject to DSE assessment process**	
Slips trips or falls	**Obstructions, trailing cables etc on thoroughfares throughout University campus**	**Researcher**	• **Researcher vigilance in public areas.** • **University under regular review of working space to ensure health and safety.**	

Appendix J

Participant information sheet.

Project title: Metacognitive Ability: The relationship between critical thinking and state anxiety, and what this suggests for perceived self-worth, trait anxiety and academic identity'.

Researcher: Brittany Nockalls **Email: U1563003@unimail.hud.ac.uk**

Postgraduate Researcher at the University of Huddersfield, Queensgate, Huddersfield, HD1 3DH

Supervisor: Gurjog Bagri **Email: g.s.bagri@hud.ac.uk**

For my Master's research project I am exploring how an individual's metacognition relates to performance and how this reflects their level of anxiety, along with their views on self-worth and academic identity. Metacognition is simply the process of a person being aware of their own thoughts and thinking process, for example the process of a person noticing their thinking and thought processes when carrying out tasks, such as problem solving. As students are now often expected to complete academic work that heavily relies on the ability to critically think as part of their undergraduate degree (e.g. in laboratory reports), it is now hugely important to explore ways to harness and improve these skills e.g. reducing test-related anxiety and improving well being.

To do this you will have already completed an online questionnaire that looked at the way you think. I would now like to invite you to an individual follow up session where you will be given a short task to complete (e.g. analysing a short passage from an article or journal) and will be asked speak your thoughts aloud whilst completing it. After I would like to conduct a short semi-structured interview around themes of self-wroth, anxiety and academic identity. The session should last approximately 30-45 minutes however this will vary between individuals.

Data will be analysed accordingly and will be coded via your University student number in the form of participant numbers and pseudonyms (different names) to keep your identity anonymous. All data will be kept strictly confidential between my supervisor and myself and all electronic data will be stored on a password-protected University K- Drive. Individuals will be free to pass on certain questions if they so wish and have the right to withdraw, prior to, or at any time within the study. *It should be noted that some people may find some questions and themes slightly upsetting and therefore so please consider if you are likely to cause discomfort to yourself by talking about personal traits, such as anxiety and self-worth.*

By completing the form below you are consenting to the possible risk of psychological discomfort. If you wish to proceed please take time to read and sign the following consent from and inclusion criteria before we begin. Thank you for your time.

Appendix K

Consent form.

University of HUDDERSFIELD
Inspiring tomorrow's professionals

Metacognitive Ability: The relationship between critical thinking and state anxiety, and what this suggests for perceived self-worth, trait anxiety and academic identity'.

Data gathered during this research will be treated as strictly confidential and will be securely stored. Please answer each statement below regarding the collection and use of the research data by ticking the appropriate box.

Please also note the University's regulations regarding the handling of personal data:
- The University of Huddersfield is responsible for the secure management of the data, i.e. the 'data controller'.
- The legal basis for the collection of the data is usually 'a task in the public interest'.
- The researcher or research team (including transcribers) is the recipient of the data i.e. 'the data processor'.
- The data subject (e.g. participant) should contact the University Solicitor (as the Data Protection Officer) if they wish to complain about the management of their data. If they are not satisfied, they may take their complaint to the Information Commissioner's Office (ICO).
- Electronic data will be stored only on password secured university K-Drive computer equipment and storage devises and will be destroyed as soon as it is no longer needed (e.g. 1-3 Years).

	Yes	No
I acknowledge the information stated above regarding the University's use of handling personal data.		
I have read and understood the information sheet.		
I have been given the opportunity to ask questions about the study and have had my questions answered satisfactorily.		
I voluntarily agree to take part in this research in full awareness of any possible risk associated with the study.		
I understand that I can withdraw from the study at any point without having to give an explanation.		
I agree to notes being taken and used for research purposes.		
I agree to interviews being audio recorded and the contents being used for research purposes.		
I understand that my identity will be protected and all data will be anonymised as pseudonyms (different names) or participant numbers for this part of the study.		
I understand that direct quotes or sections of my transcript may be used and that this may contribute to readers recognising my data.		
I agree to the data (in line with conditions outlined above) being archived and used by other bona fide researchers.		
I agree to my audiotapes (in line with the conditions outlined above) being archived and used by other bona fide researchers.		
I agree to complete the separate inclusion form.		
I would like to see a copy of the summary of results via email.		

Name (printed): _____

Signature: _____ Date: _____

Appendix L

Inclusion form.

Thank you for consenting to take part in the following research. Please circle the answer to the following questions to confirm that you are fit to take part in this study.

Age:

Gender: Male Female

Do you suffer from any severe mental health issues?

Yes No

Have you sought help as a result of severe mental health issues in the last 6 months?

Yes No

Are you knowingly likely to cause extreme distress to yourself by talking about slightly sensitive topics such as self worth, identity and anxiety?

Yes No

Are you likely to cause harm to yourself by talking about such issues?

Yes No

Do you regard yourself as being psychologically fit to take part in this study?

Yes No

Name (printed): _____

Signature: _____ Date: _____

Thank you for your time.

Appendix M

Debrief sheet.

University of HUDDERSFIELD
Inspiring tomorrow's professionals

Project Title: *'Metacognitive Ability: The relationship between higher critical thinking and lower state anxiety, and what this suggests for an individuals perceived self-worth, trait anxiety and academic identity'.*

Thank you for your perception in this study.

This study aimed to compare levels of metacognition (e.g. an individual's way of thinking) with performance for a given task. It also aimed to see if an individual's thought processed were directly related to their levels of anxiety and also opinions that they believed about themselves e.g. their level of self-worth and believed identity within education. The methods of saying your thoughts aloud was a method called verbal protocols and aimed to get a clearer idea of what was happening when students demonstrate critical thinking. The data collected today will be analysed accordingly in a way that highlights the student's experience and contributes to improving performance and well being within education.

A one-page summary stating the findings of this study may be sent to you via email if you have stated you wish to receive a summary of the results on the consent form. If you experience any signs of stress, psychological discomfort, or have been affected by matters in relation to today's study, please familiarise yourself and contact the lines of support on the next page in order to discuss issues further. You have the right to withdraw your data until the **1st August 2019.**

Thank you

Lines of support

Huddersfield University Wellbeing Services:
Tel: 01484 471001
Email: studentwellbeing@hud.ac.uk

Mind Info Line:
Tel: 0300 123 3393 |Text: 86463
Email: info@mind.org.uk
Web: https://www.mind.org.uk/information-support/helplines/

Samaritans Helpline:
Tel: 116 123
Email: jo@samaritans.org
Web: https://www.samaritans.org/how-we-can-help-you/contact-us

Anxiety UK:
Tel: 08444 775 774
Web: www.anxietyuk.org.uk

Depression Alliance:
Web: www.depressionalliance.org

Mental Health Foundation:
Web: www.mentalhealth.org.uk

Rethink Mental Illness:
Tel: 0300 5000 927
Web: www.rethink.org

For further information, please see the link below or consult your local GP.

http://www.nhs.uk/Conditions/stress-anxiety-depression/Pages/mental-health-helplines.aspx

Appendix N

Online consent form.

Consent form.

University of HUDDERSFIELD
Inspiring tomorrow's professionals

Metacognitive Ability: The relationship between critical thinking and state anxiety, and what this suggests for perceived self-worth, trait anxiety and academic identity'.

Data gathered during this research will be treated as strictly confidential and will be securely stored. Please answer each statement below regarding the collection and use of the research data by ticking the appropriate box.

***Please also note the University's regulations regarding the handling of personal data:**
- The University of Huddersfield is responsible for the secure management of the data, i.e. the 'data controller'.
- The legal basis for the collection of the data is usually 'a task in the public interest'.
- The researcher or research team (including transcribers) is the recipient of the data i.e. 'the data processor'.
- The data subject (e.g. participant) should contact the University Solicitor (as the Data Protection Officer) if they wish to complain about the management of their data. If they are not satisfied, they may take their complaint to the Information Commissioner's Office (ICO).
- Electronic data will be stored only on password secured university K-Drive computer equipment and storage devises and will be destroyed as soon as it is no longer needed (e.g. 1-3 Years).

	Yes	**No**
I acknowledge the information stated above regarding the University's use of handling personal data.		
I have read and understood the information previously given regarding the study.		
I voluntarily agree to take part in this research in full awareness of any possible risk associated with the study.		
I understand that I can withdraw from the study at any point without having to give an explanation.		
I understand that my identity will be protected and all data will be anonymised as pseudonyms (different names) or participant numbers if I should be contacted for the second part of the study.		
I consent to my university student number being used to contact me and code my data.		
I agree to the data (in line the with conditions outlined above) being archived and used by other bona fide researchers.		

Name (printed): _____

Signature: _____ Date: _____

Appendix O

Online debrief sheet.

University of HUDDERSFIELD
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Project Title: *'Metacognitive Ability: The relationship between higher critical thinking and lower state anxiety, and what this suggests for an individuals perceived self-worth, trait anxiety and academic identity'.*

Thank you for your perception in this study.

This study aimed to compare levels of metacognition (e.g. an individual's way of thinking) with performance for a given task. It also aimed to see if an individual's thought processed were directly related to their levels of anxiety and also opinions that they believed about themselves e.g. their level of self-worth and believed identity within education. The data collected today will be analysed accordingly in a way that highlights the student's experience and contributes to improving performance and well being within education.

If you experience any signs of stress, psychological discomfort, or have been affected by matters in relation to today's study, please familiarise yourself and contact the lines of support on the next page in order to discuss issues further. You have the right to withdraw your data until the **1st May 2019.**

Thank you.

Lines of support

Huddersfield University Wellbeing Services:
Tel: 01484 471001
Email: studentwellbeing@hud.ac.uk

Mind Info Line:
Tel: 0300 123 3393 |Text: 86463
Email: info@mind.org.uk
Web: https://www.mind.org.uk/information-support/helplines/

Samaritans Helpline:
Tel: 116 123
Email: jo@samaritans.org
Web: https://www.samaritans.org/how-we-can-help-you/contact-us

Anxiety UK:
Tel: 08444 775 774
Web: www.anxietyuk.org.uk

Depression Alliance:
Web: www.depressionalliance.org

Mental Health Foundation:
Web: www.mentalhealth.org.uk

Rethink Mental Illness:
Tel: 0300 5000 927
Web: www.rethink.org

For further information, please see the link below or consult your local GP.

http://www.nhs.uk/Conditions/stress-anxiety-depression/Pages/mental-health-helplines.aspx

Appendix P

In person interview questions.

The semi-structured interview session will consist of questions based upon the following guide, however some questions may change:

Thank you for attending this session today, this part of the study should last around 15- 30 minutes. A reminder that all information collected today will be kept anonymous and as a participant you have the right to withdraw from the study at any time.

Do you have any questions before we start?

Okay thank you for your answers and attending this session. Please read through the debrief sheet provided and ask any questions you may have. Thank you for your time.

1. In a general sense, how would you normally describe your levels of anxiety?
2. For example, would you say you are/are not an anxious person?
3. What types of situations normally raise your anxiety?
4. Did you feel anxious at all completing the previous task? (And if so, why?)
5. What about within education? How would describe your levels of anxiety at university (with deadlines, workload, uni life etc.)?
6. How do you normally feel when you get your grades back?
7. How does this compare with how you feel when you get a grade you wasn't expecting?
8. Would you describe yourself as being successful within education? (And why?)
9. Have you always felt this way or has this changed as you've progressed through education?

10. Okay thank you so moving on, do you generally believe in yourself? (If no, why?)

11. What makes you believe in yourself?

12. Do you think you value yourself enough? (If not, why?)

13. Do you think others value you?

14. Do you generally feel valued at university?

15. What would it take for you feel even more valued?

16. Brilliant okay so on a general basis, how much effort do you think you put in to your university work?

17. Why do you put this level in?

18. Do you think your last grade will reflect how well you do in your next assignment?

19. How would you describe your identity?

20. Do you think your identity changes as a student?
21. What makes up your identity would you say?

22. Are you aware of your own identity?

23. What would you say if I asked you what your academic identity looked like?

24. Why did you decide to come to university?

25. Why did you decide to study psychology?

26. Tell me about your life as a student.

27. How important is your learning as part of your life now?

28. What do you think affects your experience of being a learner?

Appendix Q

Online participant information sheet.

Metacognitive Ability: The relationship between critical thinking and state anxiety, and what this suggests for perceived self-worth, trait anxiety and academic identity'.

Thank you for choosing to complete this questionnaire.

For my Master's research project I am exploring how an individual's metacognition relates to performance and how this reflects their level of anxiety, along with their views on self-worth and academic identity. Metacognition is simply the process of a person being aware of their own thoughts and thinking process, for example the process of a person noticing their thinking and thought processes when carrying out tasks, such as problem solving. As students are now often expected to complete academic work that heavily relies on the ability to critically think as part of their undergraduate degree (e.g. in laboratory reports), it is now hugely important to explore ways to harness and improve these skills e.g. reducing test-related anxiety and improving well being.

What will you be doing?

You will be asked a series of questions that will help to identify the way you think and how this reflects your personal traits e.g. level of anxiety. This questionnaire should take about 20-30 minutes to complete.

If you wish to continue information regarding your grades and previous qualifications will also be obtained for data analysis, however all data will be stored securely on a password protected K drive and kept strictly confidential between my supervisor and myself. It should be noted that some people might find some questions slightly upsetting and therefore please consider if you are likely to cause discomfort to yourself by talking about personal traits.

By beginning the questionnaire you are consenting to the slight risk of psychological discomfort and the use of your university student number to possibly contact you via email, regarding the second part of the study. If you are contacted for the second stage your university student number will be used to code and anonymise your data.

Appendix R

Online interview questions.

Thank you for deciding to complete this interview. Please record your voice on your phone or computer as you read and contemplate each question, as you would in a normal interview. Please note some of the questions may over lap and cover areas you have previously discussed, however try to consider each question as thoroughly as you can and take as much time as you need. Please read each question aloud, or it's number, before you begin answering.

1. In a general sense, how would you normally describe your levels of anxiety?
2. For example, would you say you are/are not an anxious person?
3. What types of situations normally raise your anxiety?
4. Did you feel anxious at all completing the previous task? (And if so, why?)
5. What about within education? How would describe your levels of anxiety at university (with deadlines, workload, uni life etc.)?
6. How do you normally feel when you get your grades back?
7. How does this compare with how you feel when you get a grade you wasn't expecting?
8. Would you describe yourself as being successful within education? (And why?)
9. Have you always felt this way or has this changed as you've progressed through education?
10. Okay thank you so moving on, do you generally believe in yourself? (If no, why?)
11. What makes you believe in yourself?
12. Do you think you value yourself enough? (If not, why?)
13. Do you think others value you?

14. Do you generally feel valued at university?

15. What would it take for you feel even more valued?

16. Brilliant okay so on a general basis, how much effort do you think you put in to your university work?

17. Why do you put this level in?

18. Do you think your last grade will reflect how well you do in your next assignment?

19. How would you describe your identity?

20. Do you think your identity changes as a student?
21. What makes up your identity would you say?

22. Are you aware of your own identity?

23. What would you say if I asked you what your academic identity looked like?

24. Why did you decide to come to university?

25. Why did you decide to study psychology?

26. Tell me about your life as a student.

27. How important is your learning as part of your life now?

28. What do you think affects your experience of being a learner?

Thank you for your answer. Please read through the debrief sheet provided and feel free to ask any questions you may have. Thank you for your time.

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