UNIVERSITY OF WINCHESTER

Students' Time Management in the Classroom: exploring U.S. teacher and student perceptions

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Doctor of Education

June 2022

This Thesis has been completed as a requirement for

a postgraduate research degree of the University of Winchester

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Dedications and Acknowledgement

Dedication:

This thesis is dedicated to my parents who are my inspiration and models of being a lifelong learner.

Acknowledgement:

I would like to thank my advisory team, Dr. Frances Warren, Dr. Laura Clarke and Dr. Janice De Sousa for their insights and support throughout this academic journey.

My gratitude to Mr. Ian Fraser whose encouragement and support made this journey a reality and a steppingstone for the future.

UNIVERSITY OF WINCHESTER

ABSTRACT

Students' Time Management in the Classroom: U.S. exploring teacher and student perceptions

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January 2022

Time management is an executive function (EF) skill which affects a student's ability to complete tasks in a timely manner in school, as well as being a life skill for successful higher education and employment. This research explores student classroom time management skills from two perspectives: teachers' and students'. Early adolescent students (ages 11-14 years) were selected due to rapid cognitive, prefrontal lobe development during these years combined with increased demands at school to be independent. EF can be characterized as metacognitive and social/emotional and includes a set of coordinated cognitive capacities which engage organization, strategic thinking, self-regulation and goal-directed behaviours. For this study, time management was defined as students using time efficiently to complete assignments within the teacher's specified length of time. Semi-structured interviews were conducted with ten teachers and ten students across the United States. These interviews explored participants' perceptions of the importance of time management to academic success, student proficiency, teacher expectations, student struggles and the use of time tools, such as clocks and timers. Cognitive load theory (CLT) was the framework used to discuss potential instructional practices. Transcripts were analyzed using qualitative content analysis (QCA) organized by related research questions. The analysis revealed agreement that time management was deemed important for academic success and many students were not proficient. There was less agreement regarding expectations, required skills and student struggles. Both metacognitive and social/emotional aspects were revealed including a lack of temporal sense and motivation. Teacher pedagogy of explicitly teaching time management was also discussed. Analogue clocks are present in nearly every classroom; however, students overwhelmingly prefer digital clocks due to the ease of determining the time. Both analogue clocks and timers were preferable for showing the passage of time. The data analysis suggests a benefit to teachers explicitly including time management skills in their pedagogy.

Keywords: Time management, executive function, cognitive load theory, early adolescents, clocks

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CHAPTER 1 – INTRODUCTION

'In the face of educators who need to make decisions about what to do, we need knowledge that helps to solve practical problems' (Stemhagen & Warnick, 2010:116).

A primary goal of education is preparing students for their future. This includes both academic content curriculum and life skills. Executive function (EF) skills are life skills that can be defined, in general terms, as the 'directive capabilities of the human brain' (McCloskey et al., 2009:13) or the brain-based skills needed to perform a task (Dawson & Guare, 2009). These are skills needed for school, work, and everyday living. Managing time is an EF skill (Dawson & Guare, 2009; Kaufman, 2010; Mäntylä et al., 2007; McCloskey et al., 2009) and affects students' ability to complete tasks in a timely manner, both in and out of the classroom, today and in their future.

This research seeks to explore both teachers' and students' perceptions of time management skills within classrooms of early adolescent students ages 11-14 years. Time management is defined for this research as students using time efficiently to complete assignments within the teacher's specified length of time. The motivation is to better understand classroom time management and suggest areas of further research which may yield practical pedagogy for teachers on how to support time management skill development.

The genesis of this research was a personal observation of contrast. After over a decade of teaching at a large, high performing middle school, I moved to a small, specialized school where executive function skills were explicitly taught. Teachers and students talked about and practiced EF skills, including time management, as part of their daily classroom experience. In my prior school, I frequently perceived students struggling with time management. Reflecting on this experience led to the question, 'How can we support time management skills for all students?' Approaching this question as a pragmatic, post-positivist using the scientific method, the next step was to do background research. This thesis is a survey of current research, using the specific lenses of EF and cognitive load theory (CLT), as well as an exploration of teachers' and students' perceptions, in their own words. A primarily qualitative approach is used because the research question is broad and specific data cannot be defined (Denscombe, 2017). Research of EF skills in the education setting have not been widely investigated (Reed, 2016) which limits the amount of background information available. This research is exploratory, seeking to combine current literature, a unique perspective, and the perceptions of a small group of teachers and students. The use of semi-structured interviews gives voice to and insight regarding individual experiences in the classroom. This research is not designed to be generalizable. Rather it is exploratory and illuminating, building information

needed to construct hypotheses for further research, as well as pragmatic pedagogy for classroom teachers.

A mixed methods approach has been utilized analyzing predominantly qualitative data with limited quantitative data used to make comparisons with similar questions from an earlier web-based questionnaire pilot study. The pilot study, completed in December 2020, surveyed teachers' perspectives on students' time management in their classrooms. Quantitative data comes from the pilot study's web-based questionnaire and includes the distribution of responses to closed questions. Thesis interviews are analysed using qualitative content analysis (QCA) organized by the research questions. In general, this type of research focuses on subjective experiences of participants and seeks to describe and identify meaning (Cohen et al., 2018).

Using a broad definition of a case study as, 'an exploratory form of inquiry providing an in-depth picture of a unit of study, which can be a person, group, organization or social situation' (Mills & Birks, 2014:145), a case study methodology has been used. This research has embedded a smaller case study group of one teacher and four students from the same classroom in Ohio. This opportunity arose due to participant interest and was not in the original design. This provided a unique insight into comparing one teacher's perceptions with four students in the same classroom regarding time management expectations. To reference this group, participant identifiers were changed to CT for the teacher and C1-4 for the students to identify the common school. Their data will be included in the overall analysis of teachers and students, and separately as a sub-study looking at teacher and student perceptions of the same environment. The teacher was not made aware by the researcher of which students participated and no specific students were discussed in the interview. This does not permit a direct comparison between the teacher's perceptions and a specific student. However, this design was needed for confidentiality and ethical considerations.

This research investigates children's, early adolescent students, ages 11-14 years, time management skills, as part of executive functioning, specifically from the perspective of teachers and the students themselves. Additionally, the perceived use of clocks, both analogue and digital, as a time management tool will be included. For this study, time management will be defined as students using time efficiently to complete assignments within the teacher specified length of time in the classroom. The following guiding questions were used to inform the semi-structured interviews prompts and analysis.

Interview Guiding Questions/Subquestion
1. What are teacher's perceptions of students' time management skills and strategies?
2. What are students' perceptions of their own time management skills and strategies?
3. What time tools are perceived to be helpful in supporting middle level students' time management skills?
3.a. Is there a preference between analogue and digital clock use?

TABLE 1 GUIDING QUESTIONS USED TO DEVELOP INTERVIEW PROMPTS

This thesis is structured using increasing specific types of questions. The guiding questions (Table 1) are the broadest and represent an overview of the topics to be addressed. The research questions are more specific versions of each of the guiding questions and were used as a framework for analysis. Finally, interview questions were the prompts used in the semi-structured interviews, worded informally and tailored to the whether the participant was a teacher or a student. Appendix 1 contains an example of how each type of question related to each other. The interview question responses provided the data for analysis of each research question.

The structure of this thesis consists of a literature review of using time and clocks, and current thinking regarding executive function skills concentrating on time management, unique characteristics of middle school, and cognitive considerations. This unique combination frames a research gap looking specifically at time management within the classroom during the ages of 11-14 years when there are changes in student's school environments and rapid growth of cognitive ability. Cognitive load theory (CLT) will be discussed when considering the demands on the working memory (WM) of students for time management strategies. The research presented is derived from a semi-structured interview methodology with teachers of and students, ages 11-14 years, in the U.S. The prompts for these interviews were informed by a pilot study consisting of an international web-based survey of teachers of students ages 11-14 years. Finally, conclusions and areas of further research will be discussed.

CHAPTER 2 – LITERATURE REVIEW

This literature review supports the research aim of exploring perceptions of early adolescent students' time management proficiency. Time management is discussed as part of executive function (EF) skills. Within this aim, two perspectives will be sought, teachers' and students'. In addition, the use of clocks, both analogue and digital, will be explored as a tool for time management. In framing this research, aspects of time will be discussed including time management as part of EF skills, early adolescent students who are primarily in middle school in the U.S. (students ages 11-14 years) as a unique age group, cognitive considerations, and cognitive load theory (CLT) as a theoretical framework.

CHAPTER 2.1 - LEARNING TO USE TIME

'Time, as economists tell us, is a resource – one that can be used productively or squandered' (Larson, 2001:160).

The concept of time is one we encounter every day. We use it to structure and understand our world, order events, measure duration and intervals between events, along with the rate at which they occur (MacDonald & Murphy, 2020). 'In the modern world, time is seen as an indefinitely divisible and usable commodity,' (Nasrullah & Kahn, 2015:66). 'But unlike other types of measurements, such as length and weight, time is not physical' (MacDonald & Murphy, 2020), you cannot touch it. Additionally, unlike other senses, there is no one organ which senses time (Burdick, 2017; Gallistel, 1996). Our understanding and knowledge of time comes from a variety of sources. For children, this understanding is developed both in and out of the classroom. When understanding time from a physiological perspective, the experience includes duration, temporal order, tense (past, present, future) and a 'feeling of nowness' (Burdick, 2017:26). Looking at time in terms of human cognition, there are important educational insights when considering brain structures and cognitive functions in terms of evolution by natural selection (Sweller et al., 2011). This viewpoint, developed by Geary (Geary, 2005), considers human cognition as a natural information processing system with an architecture of biologically primary and secondary knowledge (Sweller et al., 2011, Garnett, 2020). Sweller has stated that, 'Without an understanding of human cognitive architecture, instruction is blind' (ResearchEd, 2017). Biologically primary knowledge is knowledge humans have acquired through evolution and includes general problem solving, speech

and listening. Each primary skill likely evolved separately during different evolutionary periods (Sweller et al., 2011). Biological secondary knowledge, such as reading and writing, is acquired by societies for cultural reasons. What is taught in schools is biologically secondary knowledge. This is similar to Vygotsky's thoughts that cultural tools are not inherited, but rather developed by social interactions and communicate how to make sense of the world (Aubrey & Riley, 2019). Using this construct, time may be considered to be both primary and secondary knowledge. Perceptions of time, such as the passage of day to night and past-present-future, are best described as biological primary knowledge. For example, from a developmental psychology perspective, it is believed that infants in their first few months of life can distinguish 'now' from 'not now' (Burdick, 2017:26). How to tell time, the use of clocks or other time tools and classroom time management fits within biological secondary knowledge.

The understanding of biological primary and secondary knowledge is important in differentiating what can or cannot be taught, with implications for classroom instruction. As noted, it can be difficult to distinguish between the two. It cannot be assumed that if something is learned easily and automatically without being explicitly taught that it is biologically primary knowledge. From a developmental psychology view, many time-based experiences, such as duration, feels innate, but that is considered an adult perspective with time being something humans grow to know gradually (Burdick, 2017). It has been noted that there is a frequent failure in making this distinction between biologically primary or generic-cognitive knowledge, and biologically secondary or domain-specific knowledge (Tindall-Ford, 2020). The assumption that certain skills are biologically primary would discourage the development of instructional material in those areas. For time and time management, identifying what is biologically secondary focuses instructional practices on the areas of greatest impact to students.

Being able to tell time is biologically secondary knowledge. The history of our use of time tools starts with the sundial. Clock time is an abstraction of the natural cycles of the sun (Levinson, 2004). Specifically looking at the U.S., in the eighteenth century, the primary time keeping tool was the sun and the primary occupation was farming (Levinson, 2004). The invention of time keeping devices assists in being able to use time horizons and planning future events (Barkley, 2012). Analogue and digital clocks are the two predominate types in society today. Society has long valued timepieces as a symbol of status and wealth. As an example, Thomas Jefferson gave his grandchildren watches on their twelfth birthdays symbolizing their entry into the 'time conscious world of grownups' (Levinson, 2004:10). Levinson (2004) noted in 2004 that 'quartz watches with analogue dials sell more than digital displays' with the reasoning that analogue representations are

so 'entrenched that they cannot simply discard it.' More recently, in 2020, the global watch market was a $58.28 billion industry and growing, with analogue watches dominating the market. Even considering a growth in fitness watches, analogue watches are still preferred (Businesswire, 2021). The use of watches and clocks continues today with clocks still a feature in classrooms.

Analogue and digital clocks represent time and its properties differently. Analogue clocks show the passage of time as a spatial distance and is a cultural tool based on principles of a number line (Earnest, 2015). This is described in an excerpt from Earnest (2015:286):

> If we consider the hour hand for 5:10, for example, one may interpret its position as not just showing the '5' as with digital notation, but its displacement from 5:00 to 5:10, as well as the length corresponding to the 50 minutes remaining in the hour from 5:10 to 6:00.

How we speak of time and tell time reflects a cultural history and agreement of the how, or the rules for their meaning and use. Being able to use complex time expression is an essential skill of adults (Meeuwissen, 2004). Mathematical meaning is not inherent in its representation (Earnest, 2021). For example, analogue clocks show a time duration of 12 hours, with designations of a.m. and p.m. The intervals around an analogue clock translate time, an invisible quantity, into a length which can be measured (Earnest, 2021). For children, learning to tell the time is a challenge and manipulatives of analogue clocks are commonly used. There are two types, one with hour and minute hands linked thus moving together to show the passage of time, and another with unlinked hands moving independently (Earnest et al., 2017; Earnest, 2021). These manipulatives of analogue clocks loosely resemble a sundial and apparent movement of the sun throughout the day. Digital displays are more abstract in nature (Levinson, 2004).

Telling the time, time identification, has been shown to be easier with digital clocks (Friedman & Laycock, 1989) and more precise (Earnest 2015). Digital clocks express time as numbers with the hour separated by a ':' and the minutes. Since students typically learn their numbers prior to learning about intervals, digital clocks are easier to read at a younger age (Earnest, 2021). The numbers, hour and minute, do not reflect the relationship between the two units and do not require coordinating the position of two hands with superimposed units that is required with analogue clocks. (Earnest, 2015). Research by Bright and Burton working with young adults, showed ‘significantly better’ performance reading digital as compared to analogue clock faces (Bright & Burton, 1994:83). Their discussion suggests that when telling the time, analogue clock faces have more redundant information than digital displays. This additional information could confuse and/or reduce the users’ confidence. The discussion does not extend to understanding the passage of time where the additional information on an analogue clock face may be helpful.

Comparing analogue and digital clock reading in elementary students (ages 7-12 years), digital clocks were read correctly more consistently for all grade levels (Boulton-Lewis et al., 1997). In this multi-part study by Boulton-Lewis et al (1997) interviewed groups of students were asked to read and record analogue and digital clocks times. Older students were also asked to explain their strategies. Consistent with their findings with reading clock faces, recording digital time was shown to be easier for students (Boulton-Lewis, 1997). Regarding strategies when reading analogue clocks, using 'increments of fives and/or ones, identifying the hands, and recognising landmarks or quarters on the clock were the most frequently used by all grades' (Boulton-Lewis et al., 1997). The Boulton-Lewis et al (1997) study has a similar design to this project in having students read the time and relate their strategies. This project extends that method by having students add, then relate how they calculated, thirty minutes to the time shown on both analogue and digital clock faces. This provides insight into students' metacognition and an additional comparison of analogue and digital clock proficiency of students.

In both Bright and Burton (1994) and Boulton-Lewis et al (1997), participants are asked to tell or record the time. Neither study investigates an understanding of how students use that information. Bouton-Lewis specifically notes that, 'An overall comparison of correct responses for reading analogue and digital times shows that digital times are easier. This does not mean, however, that children fully understand what they are reading' (Boulton-Lewis et al., 1997:149). This uncertainty regarding student understanding can be extended to the passage or use of time.

Timers are perceived as an easy and effective way to assist students with the passage and use of time. Time counters show the amount of time elapsed (ascending) or remaining (descending), also known as countdown timers, and may have either an analogue or digital readout (Abdel Karim & Shukur, 2016). Count timers are a tool often recommended for students struggling with time management skills (Dawson & Guare, 2009; Branstetter, 2014). Research with preschoolers (ages 3-5 years) showed an increase in remembering to perform a task in the future (prospective memory) when a timer was used (Redshaw et al., 2016). In research exploring timer preferences, Abdel Karin and Shukar (2016) found that undergraduate and post graduate students, when taking online examinations, preferred countdown (descending digital) timers over digital ascending timers, analogue timers or no timers. The digital countdown timer was the most favoured type by 42% with the analogue timer coming in second (30%), followed by ascending digital (22%) and no timer (6%) (Abdel Karim & Shukur, 2016:419). An explanation of student preferences was not included in this research. However, one of the premises is that characteristics of the test takers, such as cognitive (skills and intelligence traits) and psychological (behaviours) aspects are important to consider when

developing online testing for student use (Abdel Karim & Skukur, 2016). Whether the tool is analogue or digital, a timer or a clock, time tools are prevalent in society and the ability to use them effectively is a skill needed for students.

CHAPTER 2.2 - TEACHING TELLING TIME AND MATHEMATICS

'The concepts of time and mathematics are inextricably linked' (Fitz, 2016:21).

Telling time is often first developed in classroom lessons and extended to relate to time in everyday settings with each student's understanding developing at an independent rate (Aldridge & White, 2002). Telling time is familiar to students because they use it to track their day (Fitz, 2016). Clock reading within primary mathematics education is a cognitive skill that is perceived as difficult and makes great demands on both teachers and students (Burny, 2012; Earnest et al., 2017; Van Stennburgge et al., 2010). As an essential construct, time is needed for children's understanding of daily life, at home, school, and the wider world (MacDonald & Murphy, 2020). Despite its importance, there is limited research into children's learning about time and understanding of clocks (MacDonald & Murphy, 2020). How to read a clockface is the traditional approach with dial reading the method used for analogue clocks (Aldridge & White, 2002).

Time telling is part of the early primary school mathematics measurement curriculum, in the sub-domain of clock-reading knowledge (Burny et al., 2013). The understanding of a clock system may extend earlier from the preschool years (Friedman & Laycock, 1989; MacDonald & Murphy, 2020). A study looking at 16 preschool children's narratives indicated some understanding of clocks related to daily routines, such as breakfast, with eight children able to draw a specific time (McDonald & Murphy, 2020:20). Regardless of when students begin learning to tell time, this ability increases until most students can read an analogue clock to the nearest minute by the age of 10 years (Burny et al., 2009). In the U.S., Common Core State Standards Mathematics (CCSS), time standards begin in the first grade (ages 6-7 years) with telling and writing time in hours and half hours using both analogue and digital clocks. Second grade students would refine these skills with telling and writing time to the nearest five minutes and using a.m. and p.m. The final year of formal standards is fourth grade where students are taught to solve problems involving measurements and estimations, by telling and writing time to the nearest minute, measuring time intervals in minutes and solving word problems involving addition and subtraction of minutes (CCSS Mathematics

Measurement & Data Domain). The U.S. is not unique in their timing of these mathematics standards. This progression of standards is similar to the U.K. National Curriculum. The two sets of standards are compared in Appendix 1.

Both analogue and digital clocks are commonly taught when children learn to tell time in school. Reading the time, a first component of teaching time, appears to involve multiple processes which differ considerably between analogue and digital displays. Analogue clocks use a mixture of approaches including using the spatial properties of the display. Digital displays use mainly numerical approaches. Reading a digital clock is primarily a matter of retrieving number names with little variation between problems, and fewer cognitive process demands than when reading an analogue clock (Friedman & Laycock, 1989). An issue to consider is that not all times are equally demanding on analogue clocks. Some times are easier to read than others. For example, 4:00 is easier than 4:38. When primary school students have severe difficulties with analogue clock reading, a frequent teacher strategy is to switch to digital clocks (Burny, 2012).

Though digital clocks appear to be the easier clock to teach, the Canadian standards have a note of caution to teachers.

> Digital clocks are easier to read but may be more challenging to understand. To know that 9:58 is almost 10:00 requires an understanding that there are 60 minutes in an hour. This is unlike the place-value system, which moves in groups of 10 and 100. Using both digital and analogue clocks helps make the 0 to 60 scale visible (Ontario Canada Curriculum and Resources, 2021).

With digital clocks, the notion of 'twenty minutes from now' becomes more difficult. Unlike the circular display on an analogue clock showing time in context to past and future, a digital clock shows time as a single unit (Mielo, 1995). Analogue clocks require determining the positions of the hands for hours and minutes and then conceptually determining the reference point and the distance from that point in minutes whereas digital clocks minimally involved determining hours and minutes from the digits (Meeuwissen et al., 2004). The concept of 'about' time and the vocabulary used between clock types differ (Meeuwissen et al., 2004; Earnest, 2021). In research by Earnest (2021), students approached problems differently when phrased as 'half an hour' or 'thirty minutes' (Earnest, 2021). Korvorst et al (2007) looked at the way relative (e.g. quarter after) and absolute time (e.g. one-thirty) reading varied between analogue and digital clocks and found that relative time telling followed a conceptual planning route for both analogue and digital clocks but was non-conceptual and faster for absolute time using digital clocks (Korvorst et al., 2007). There is limited

research on children's development of their understanding of clocks (MacDonald & Murphy, 2020). For this reason, questions such as clocks' cognitive loads, developmental sequence, and usefulness as time management tools are potential areas for further investigation. Countdown timers or time counters also represent a research area where there is little literature.

Beyond learning about the measurement of time, being able to understand how to read and use a clock support other mathematical concepts (Berg, 2019). Relating back to sundials, students can see how angles are applied to a real-world application (Fitz, 2016). Today, analogue clocks are one of the most ubiquitous places students see angles created between the hands (Fitz, 2016). Time is also periodic in that events, such as day-night or the seasons, repeat in a predictable manner. Finally, ratios can be shown in the segments of time between units such as seconds, minutes, hours, days, months, et cetera. (Fitz, 2016). However, the use of time to teach ratios or proportions is a challenge regarding units. Time notation is in units of 60 (minutes) and 12/24 (hours). These groupings contrast to the base-10 system of the International System of Units (aka, metric system), also taught in primary mathematics, as well as used broadly in society. This suggests that the proportional relationships of time may pose a difficulty for some students (Hurrell, 2017). There has been little research to explore how children apply and coordinate standards units in their time problem solving (Earnest, 2015).

Telling time is not the only skill required of students, but also understanding the passage of time. There is limited time research on determining elapsed time (Earnest, 2021). There is an indication, from research among U.S. middle and high school students, that some students continue to have difficulties interpreting amounts of elapsed time after primary school (Earnest, 2021). Being able to use time and understanding the passage of time is a necessary skill in an industrialized society.

The Industrial Revolution of the nineteenth century influenced thoughts about the use of time. One contributing factor was that people could successfully follow time precisely (Wittman, 2017). Railroads represented a major nineteenth century industry and were influential in accurate timekeeping for their timetables and train safety (Levinson, 2004). Clocks influenced speech and the increased use of terms referring to the clock, most notably 'of the clock' or 'o-clock' (Levinson, 2004:12). There were changes in schools, as well. By the 1830s, schools used bells based on clock time to structure an efficient use of time (Levinson, 2004). This relates well to the definition of time management in this research of students using time efficiently to complete teacher given tasks in school. The concept of efficiently is used to include time, as a resource, to students completing tasks

effectively, referring to its quality (Eysenck et al., 2007). School bells called students to class, used to organize lessons and clock reading was taught to young students. Students were punished for lateness and praised for punctuality (Levinson, 2004), much as they still are today.

Society, not just schools, was changing how it viewed time keeping. In the expanding urban and industrial age of the twentieth century, there was an increased expectation to know the time and be on time which led to reliance on timepieces, clocks (Levinson, 2004). In 1910, the term 'scientific management' was based on work efficiency studies of Frederick E. Taylor who focused on the amount of time workers needed to perform a task. His scientific tool of choice was the stopwatch (Levinson, 2004). This concept of time management was used in the workplace and in homes. Dr. Lillian Gilbreth and her husband used photography to analyze motions of common household tasks (Levinson, 2004). Gilbreth was influential in this area for over four decades, along with having twelve children. Time management skills are needed in our work, home, and school lives.

CHAPTER 2.3 - EXECUTIVE FUNCTION (EF) AND TIME MANAGEMENT SKILLS

'Time management is a common goal but an uncommon achievement' (Strom et al., 2016:38).

Using time is central to the ability to get activities completed within a specified span of time, in other words, time management. These skills sit within the larger scope of executive function (EF) skills. Executive function skills, in a broad sense, are those elements of cognition that involve self-regulation and self-direction in daily and long-term activities (Kaufman, 2010). Kaufman (2010:2) states, '...whenever people purposefully manage their thinking or behavior to achieve some desired outcome...they are engaging in the skills of executive function.' In other words, they are the skills we use to get things done. Executive function is not a trait or single (unitary) cognitive process, rather it is a set of coordinated cognitive capacities which include the ability to engage purposefully in organization, strategic thinking, self-regulation and goal-directed behaviours (McCloskey et al., 2009). These processes are engaged in cueing what activity or action needs to be done (McCloskey et al., 2009; Miyake & Friedman, 2012). The meaning of the term can vary greatly in common use and in literature, depending on the knowledge and intent of the user (McCloskey et al., 2009) and lacks an agreed upon definition (Friedman et al., 2008). The term originated in neuroscience literature (Dawson & Guare, 2009) but is now more broadly used. For many educators, it is often thought of as synonymous with organizational and study skills (Kaufman, 2010). As Kaufman states, however, 'Executive function is clearly about so much more than just organizing academic materials and getting work done on time' (Kaufman, 2010:174). This paper is not exploring all of EF, but rather the narrower scope of students getting classwork done on time. In my experience, the concept of executive function within the classroom is unknown or new to many teachers and often thought of as study skills. This deemphasizes the cognitive aspects of its development and place within classrooms. What EF is widely considered is a metacognitive process, in other words, thinking about thinking (McCloskey et al., 2009). In this research, gaining teachers' and students' perceptions about time management gives a view into their thinking.

Executive function skills vary greatly within the population (Miyake & Friedman, 2012; Friedman et al., 2008). These capabilities are thought to involve the pre-frontal cortex of the brain (Miyake & Friedman, 2012). Research indicates that EF skills have a genetic, heritable component which can be improved by training (Bjorklund, 2018; Miyake & Friedman, 2012). This 'improvement by training' implies a biologically secondary knowledge component. This improvement due to EF training appears to be transferable producing improvements of other tasks (Diamond, 2012). This

implies that practicing EF skills by embedding them in multiple activities is better than limiting practice to a simple activity (Diamond, 2011). Training can take place in the classroom with pedagogy directed at improving EF skills particularly with students who are underperforming. This pedagogy can include practicing EF skills in multiple classrooms and curriculum subject areas.

It is important to not assume that students with EF struggles or difficulties have learning disabilities. Not all children develop their EF capabilities at the same pace throughout childhood (Mahy et al., 2014). Books such as Braaten and Willoughby's, 'Bright Kids Who Can't Keep Up' and the book series by Dawson and Guare including, 'Smart, but Scattered' address this point in popular literature. Difficulties with EF are not synonymous with terms such as 'executive dysfunction' and 'dysexecutive syndrome' which have no agreed upon diagnostic schema (McCloskey et al., 2009:59). Regardless of there being no agreed upon diagnostic schema, there are a number of EF assessment including the Behavior Rating Inventory of Executive Function (BRIEF), Delis-Kaplin Executive Functions Scale (D-KEFS), and Behavioral Assessment of Dysexecutive Syndrome in Children (BADS-C) (Kaufman, 2010; McCloskey et al., 2009). There is also the Executive Function Index (EFI) that is a subjective measure of motivation, strategic planning, organization, impulse control and empathy (Yadava & Yadava, 2018).

There is no overarching structural model of EF or single theory (McCloskey et al., 2009). There exists a diverse set of articles published in the popular press, research papers and peer-reviewed journals on how to improve student EF (Diamond, 2012). Similar to other abilities, EF skills have two main contributors, experience and biology with the potential for some EF skills being innate, or 'already hardwired into the brain at birth' (Dawson & Guare, 2009:19). This concept fits with the model of biologically primary and secondary knowledge. Executive function skills, including time management, have elements of both. Since the use of time, time management, has biologically secondary knowledge components, these skills can be taught and learned both in and out of school. This implies that time management can be developed within the classroom as part of education pedagogy. As Diamond states, this is 'good news' as 'EF are critical for school and job success and for mental and physical health' (Diamond, 2012:335).

Time management is just one aspect and fits within the larger structure of executive functions. The structure and development of EF skills are viewed in different ways. In McCloskey's tiered holarchical structure, twenty-three self-regulating capacities are organized into a five-tier system: self-activation, self-regulation, self-realization/determination, self-generation, and trans-self-integration (McCloskey et al., 2009). The first three tiers are involved in day-to-day self-control

functions (McCloskey et al., 2009). The self-regulation tier describes a large number of cueing and directing functions (McCloskey et al., 2009). Part of the self-regulation tier, the time function cues monitoring the passage of time, or how much time has passed, and cues the use of time estimation, or an internal sense of how long something will take and/or how much time is left to complete a task (McCloskey et al., 2009). The arrangement in tiers has meaning both developmentally and neuropsychologically. This arrangement does not mean, however, that if one capability is well-developed that they all will be, but rather that or a person with highly capability at a higher tier can still have substantial weaknesses in one or more lower tiers (McCloskey et al., 2009).

Executive function can also be viewed as two core strands as metacognitive and social/emotional regulation (Kaufman 2010). Metacognition is the ability to observe and think about a task and includes self-monitoring and self-evaluation (Dawson & Guare, 2009). Metacognitive includes cognitive and academic elements used in comprehending information, initiation and completion of tasks, purposeful regulation and direction of learning and production. These include: goal setting, planning/strategizing, sequencing, organization of materials, task initiation, executive/goal-directed attention, task persistence, working memory, set shifting and time management (Kaufman, 2010). These skills contribute to selecting and achieving goals or developing solutions to problems (Dawson & Guare, 2009). All of these skills support students completing assignments on time, or classroom time management.

The social/emotional strand describes modulators and include response inhibition, adaptability and emotional control (Kaufman, 2010). Another way to describe these two stands or categories is 'thinking' and 'doing'. The 'thinking skills' or cognition involved working memory (WM), planning/prioritization, organization, metacognition and time management. With the 'doing' being behavioural including response and task inhibition, emotional control, sustained attention, persistence and flexibility (Dawson & Guare, 2009). For students in the classroom, the social/emotional component is often described as student motivation or focus and affects the overall time management.

Another common model of EF is one describing three general areas, inhibition, also called inhibitory control (IC), WM and cognitive flexibility or attention shifting (SH) (Miyake et al., 2000; Diamond, 2012; Friedman et al., 2008). Inhibitory control includes self-control, exercising discipline, focus, and resisting distractions and temptations (Diamond, 2012; Friedman et al., 2008). Working memory is that information held ‘in mind and mentally working with it’ (Diamond, 2012:336) or the ability to monitor incoming information and relate it to the task at hand (Friedman et al., 2008). It is

limited and can vary significantly due to levels of development (Kaufman, 2010). Cognitive flexibility, SH (attention shifting or set shifting) describes being able to move from one activity, perspective, approach to another (Diamond, 2012; Friedman et al., 2008). Student time management in the classroom involves all three of these general areas.

There is significant similarity between the described capabilities between these three EF constructs. This is evidenced by the elements of both the tiered and two category constructs and can be divided into the three categories of IC, WM and SH, or vice versa. An area of less consensus are the two skills of sequencing and task completion. This may be explained by sequencing being a skill included in planning and strategizing. Likewise, task completion may be included in goal directed attention. Overall, the constructs have many more similarities than differences. The focus of this research is on the EF skill of time management which fits within the holarchial tier of self-regulation, the metacognitive category and spans across all three general areas, IC, WM and SH. Approaching EF as an educator, using the two categories, metacognitive and social/emotional is a pragmatic construct to help guide classroom teaching practices.

Looking at time management specifically, three of the constructs have time management as a separate skill. Time management is multidimensional in nature (Kaufman, 2010) which can lead to different interpretations of the term. In McCloskey's tiered system, time management is not one of the twenty-three capacities listed. Time is and described as cues for monitoring the passage of time and estimation (McCloskey et al., 2009). To look at the term time management as used in a classroom, capacities such as initiate, inhibit, sustain, flexible/shift, organize, foresee, and pace need to be included. Kaufman does not define time management but notes that it is 'among the most essential of the metacognitive functions' and related to other functions such as goal setting and planning (Kaufman, 2010:5). Dawson and Guare define the importance of time management within EF as, 'the capacity to estimate how much time one has, how to allocate it, and how to stay within time limits and deadlines' (Dawson & Guare, 2009:17). Time management is also defined as, 'understanding and feeling the passage of time, planning good use of your time, and avoiding procrastination behaviors' by Branstetter (Branstetter, 2014:15). Time management is defined by the Cambridge dictionary as, 'the practice of using the time you have available in a useful and effective way, especially in your work' (Cambridge Dictionary, 2021). This definition is the presumed understanding of the participants prior to the interview. These discrepancies in defining time management highlights the need to define time management for this research project. Within the interviews, time management was explicitly defined as, 'students using time efficiently to complete assignments within the teacher specified length of time.' In my experience, for classroom teachers

helping students, time management is more than monitoring the time. It is viewed pragmatically as all the tasks and skills needed to get an assignment finished on time. It also implies that the students are not rushed and able to do their best on the task. This is a pedagogical view of time management which takes the colloquial definition of time management and seeks to find ways for teachers to support students by developing the needed EF skills.

Kaufman (2010) notes that in his clinical experience, time management difficulties fit within the two categories of deficits in planning/organization skills and limited temporal sense or having difficulty accurately sensing the passage of time and judging how much time is needed to complete a task (Kaufman, 2010). Both categories will be considered in this thesis. There is research focused on judging how much time is needed to complete a task. Kelly explored college students' accuracy in predicting the duration of tasks, such as the time to read a passage (Kelly, 2004b), a common task for students of all ages. Working with undergraduates, 103 students were asked to predict how long it would take to read a passage, read the passage, and then provide their perception of the accuracy of their initial prediction. The results suggested that students who perceive themselves as good predictors of time duration were more accurate (Kelly, 2004b). Kelly (2004b) goes on to posit that students who perceive themselves as less accurate may perceive that they need more time than individuals who perceive themselves as accurate. Kelly further goes on to say that this study has 'implications for educators' (Kelly, 2004b:229). This research involved college students but may also have implications for teachers' younger students. Early adolescent students are also using this time estimation skill and building their accuracy and confidence in their estimations.

CHAPTER 2.4 - EXECUTIVE FUNCTION, TIME MANAGEMENT AND ACADEMIC SUCCESS

'Executive Functioning skills can impact students' ability to showcase what they've learned in class' (McGlynn and Kelly, 2020:54).

Executive function skills are deemed a strong predictor of children's and adolescent's academic success (Samuels et al., 2016). No literature found specifically correlated the EF skill of time management with academic success. However, Nasrullah and Khan (2015) looked at time management of university students determining that it 'plays a vital role in improving students' academic performance and achievement,' (Nasrullah & Khan, 2015:66). Additionally, time management practices, such as goal setting, prioritization, and motivation are some of top indictors

of high levels of academic success (Nasrullah & Khan, 2015). Though not addressing it directly, the skills discussed are aligned with EF skills. Another recent study, Alyami et al (2021), also working with university students, found that according to student perceptions, preplanning their studies benefited academic performance with less than half the student indicated that the actually manage their time. -The work of Kelly (2004a) looks at time use efficiency and grade point averages (GPAs), a commonly used measure of academic success. Time use efficiency was defined as 'making the best use on one's time' (Kelly, 2002:13). Kelly (2003) employed the Time Use Efficiency Scale (TUES) looking at the awareness of time, awareness of what fills time and having a positive on-task work habit. One hundred forty-one undergraduate students at a U.S. university participated by taking the questionnaire and providing researchers with their GPAs. Both the TUES and GPA data were self-reported by participants. The results support the premise that greater time efficiency is related to greater overall college academic success (Kelly, 2004a). In terms of generalizing this finding for all students, it is limited by its sample size, narrow age range and self-reporting method. However, many of the academic tasks of college students are also required tasks of younger students, such as students ages 11-14, middle school.

Witkow (2009) looked at how 700 students, mean age 15 years, spent their time compared to their peers. Data was collected for two weeks through a student self-reporting checklist. The results discussed the balance between studying and time with friends. It was found that high achieving students spent the same amount of time with their friends than lower achieving students, but also spent more time studying. The study suggests that high achieving students are better at allocating time (Witkow, 2009). The allocation of time is a time management skill, as well as included under the EF skill of planning/strategizing. This would suggest that it is supporting evidence that good student time management contributes to academic success.

Time management experiences of 240 students, ages 12-14 years, were studied using a Time Management Poll by Strom et al (2016). In this study, it was noted that 'little is known about the reasoning that adolescents use for deciding how to allocate their time' with much of their time being structured for them by teachers and activities outside of school (Strom et al., 2016:40). The poll surveyed students' time of day references for specific activities such as extra-curricular activities, school start time, tests, as well as how they spent their afterschool time (for example, doing homework or watching television). Of the students polled, 57% indicated that they were always or often rushed during their day. The study discussed that when students feel rushed, they favour 'hasty methods' of processing information as opposed to being more thoughtful (Strom et al.,

2016:48). This idea may be applied to time management and students omitting planning time and starting work immediately.

CHAPTER 2.5 - MIDDLE SCHOOL AS AN AREA OF INTEREST

'There is a considerable amount to learn when students enter a new school for the first time, particularly a middle level education setting' (Knesting et al., 2008:270).

Students ages 11-14 years, early adolescence, fit with the age range for middle school students with middle school posing unique considerations for students and teachers. This unique period is when students move from having one teacher with associated expectations to multiple teachers with subject area expertise (Knesting et al., 2008; Strom et al., 2016). In the U.S., middle schools are most commonly in grades 6-8' (Juvonen et al., 2004:2) or Key Stage 3 in the U.K. The middle school concept of sixth through eighth grades has been endorsed since the 1980s to create an 'educational experience more appropriate for young adolescents' (Juvonen et al., 2004:112) compared to junior high with seventh and eighth grades (Juvonen et al., 2004; Knesting et al., 2008). Though common today, up to the 1900's, the predominate configuration was primary school for eight years and then four years of secondary school (Juvonen, 2004). The creation and popularity of the primary-middle-high school model was influenced by social pressures of increased immigration which overwhelmed primary schools in cities, industrialization driving a need for a better educated workforce and pressures from universities that student preparation should begin before ninth grade (Juvonen et al., 2004). Middle schools were created in response to social and demographic concerns more than scientific evidence supporting the benefits for a separate school for young teens (Junonen et al., 2004). There are concerns about teaching students in the 'middle' years which is not new. Juvonen's (2004:xvi) historical review showed that, 'many of today's concerns about young teens and the proper way to educate them are similar to the concerns that have been expressed for the past 100 years.'

When looking at the concerns of students in middle school, they fall within three areas: academic, social, and procedural (Cauley & Jovanovich, 2006). The academic rigour increases as students prepare for higher education. Socially, anxiety may be caused by moving to a new school, in addition to the growing importance of peer relationships (Cauley & Jovanovich, 2006). In research using a structured rating scale, adolescents placed more importance on friends than in earlier years

rating their friendships as more 'intimate' (Berndt, 1992:157). This happens at the same time as increased classroom and school procedural demands. Executive function skills are needed to address these increased procedural demands. For schooling up to this point, students have one primary teacher. However, in middle school, they typically move to a larger school, organized by academic departments, have several teachers, and a complex schedule involving rules and policies which may change with each class (Knesting et al., 2008; Cauley & Jovanovich, 2006). These changes can result in lowered school engagement and grades (Blackwell, 2007). To ease this transition, in some schools, the academic rigour of the first year of middle school is often less demanding than the last year of elementary school (Eccles et al., 1993; Juvonen et al., 2004). Looking at this critically, reducing academic rigour seems counterproductive to preparing students for higher education. In particular when this is also a time when students are involved in higher-order thinking skills such as being able to abstract, compare and differentiate concept characteristics and develop relationships between concepts (Gredler, 2011). A criticism of middle school education has been its unresponsiveness to the developmental needs of this age group (Juvonen et al., 2004). One way of addressing this criticism may be an increase in teaching EF skills in elementary school, contributing to students' preparedness for middle school. As Cauley and Jovanovich state (2006:15) 'Schools can prepare students for the transitions by becoming aware of students' needs and by taking a proactive role in addressing those needs.' In elementary school, teachers tend to focus on task initiation and sustained attention with a shift to time management, organization, planning and prioritization in middle school (Dawson & Guare, 2009). There is no need to wait for middle school to develop time management skills. Based on McCloskey's tiered structure, it is an incorrect assumption that executive capacities begin to emerge during adolescence, rather the lower tier self-regulations EFs begin developing in early childhood (McCloskey et al., 2009).

Developmentally, early adolescents are going through changes such as puberty, social and emotional development, and development of higher order cognitive skills (Cauley & Jovanovich, 2006; Eccles et al., 1993). Concurrently students' cognitive abilities grow rapidly in the ability to think abstractly and hypothetically (Cauley & Jovanovich, 2006). There is a period of rapid brain development beginning around age 11-12 years (Dawson & Guare, 2009). There are also large developmental shifts including self-realization capabilities which include increased self-awareness and self-determination (McCloskey et al., 2009). For EF skills, research shows that there is a rapid development in the brain's frontal lobe (Dawson & Guare, 2009). This brain development is associated with profound changes in the prefrontal cortex (PFC) which is the part of the frontal lobe located behind the forehead and responsible for executive processing, such as conscious control and organization. Neurons rapidly form new synapses between the PFC with other parts of the brain just

prior to adolescence. Therefore, in the first few years of adolescence, there is a rapid growth of executive processing skills (Bee & Boyd, 2010). The PFC is also the part of the brain associated with thinking about time (Zimbardo & Boyd, 2008).

The importance of peers and friends increases during middle school (Eccles et al., 1993). As students move through middle school, a study by Rathunde and Csikszentmihalyi found that students reported more often working with a peer, rather than with a friend in class (Rathunde & Csikszentmihalyi, 2005). These interactions between students occur as they learn and acquire new skills affecting their education and motivation (Berndt et al., 1988; Berndt et al., 1990). Working individually, in pairs or in larger groups is often a pedagogical choice for middle school teachers. Using a sample of seventy seventh graders in the U.S., Berndt et al (1988) found that the interactions when working with one other student whether a friend or not, did not significantly change conversations in terms of the number of statements about the task or frequency of agreements or disagreements. The conclusion was that when working on academic tasks in a school setting, the interactions between friends are comparable to those with other classmates. Looking at peer interactions is just one aspect of classroom time management for teachers to consider.

CHAPTER 2.6 - EXECUTIVE FUNCTION (EF) IN STUDENTS DURING THE EARLY ADOLESCENT YEARS (11-14 years, Middle School Years)

'Once children reach middle school, the demands on executive skills increase dramatically – and, we would argue, in many cases, unrealistically' (Dawson & Guare, 2009:27).

It is acknowledged that in middle school, students experience multiple physical, social-emotional, and intellectual changes that influence who they are and how they will function as adults (Juvonen et al., 2004) and that there are large developmental shifts in EF capabilities (McCloskey et al., 2009). Developing EF skills are important in that EF deficits are considered direct predictors of poor academic performance (Tamm et al., 2020). It is also acknowledged that EF skills are critical for academic success (Diamond, 2012). As in this research, these EF skills are explored from both the teachers' and students' perspectives. For most students, middle school is the first time they have multiple classrooms and teachers, each potentially with differing expectations regarding how work is organized, formatted, assigned, and submitted. These expectations create demands on working memory, as well as organization and time management skills (Dawson & Guare, 2009). Particularly while transitioning to middle school, when teacher expectations exceed adequate executive

capacities, the student is underprepared which shows in their academic performance (McCloskey et al., 2009). These EF deficits in academic skills affect academic content areas when the demands imposed by teachers differ from students' earlier school experiences (McCloskey et al., 2009). Looking at EF skills from a teacher's perspective provides one side of this issue.

Teachers have a key role in students' learning situations in cueing the mental processing needed to learn effectively. This takes the form of modeling, teaching and assisted practice. It is extremely important that teachers and parents, realize that these skills develop over time and require input from others (McCloskey et al., 2009). Not all teachers may have the training to support middle level students. In the U.S., only about one-quarter of middle school teachers are certified to teach that grade level, with the majority certified at the elementary level which covers through to the eighth grade (Juvonen et al., 2004). Relating this to EF, these teachers may not have the professional development to support students ages 11-14 years in their time management development. Empirical studies have shown a positive benefit to students when teachers collaborate in interdisciplinary teams across curriculum areas (Juvonen et al., 2004) and keeping expectations as predictable and consistent for students as possible (Kaufman, 2010). In the classroom, teachers can help students' structure and awareness of time by using verbal and nonverbal prompts effectively allowing students who can self-regulate with internal cue to do so and providing external cues for those students needing support (McCloskey et al., 2009). Student perceptions of a supportive classroom climate also leads to positive outcomes (Cohen et al., 2020; Juvonen et al., 2004). Drawing on this, teachers' perceptions of their students' time management skills and their role in developing them is important for student growth in this area.

Recognizing that EF skills vary widely within the same-age, same-grade of students, points to the need for planning instruction for student success (McCloskey et al., 2009). For those students behind their peers in EF capabilities, it is often attributed by teachers, and parents, to laziness, apathy, avoiding responsibility or lack of motivation (McCloskey et al., 2009). This is complicated when a student's nonperformance occurs in some subjects or classes and not in others due to differences in a student's internally commanded behaviours (intrinsic) compared to externally commanded (extrinsic) (McCloskey et al., 2009). There is a widespread belief among teachers, and parents, that students are choosing these behaviours of poor organization and production, termed the 'myth of laziness' (Kaufman, 2010:174). From birth, all children require adults to do some of their thinking for them with a gradual move to greater independent thinking, cognition, and self-regulation during adolescence (Kaufman, 2010). Teachers can help students with these EF, or frontal lobe activities, by structuring the environment and directly supervising the student (Dawson &

Guare, 2009). A teacher can act as a 'surrogate frontal lobe' (Kaufman, 2010:21) as student EF skills develop and assistance is no longer needed.

The majority of teachers do not explicitly include executive skills development into their lesson planning (Dawson & Guare, 2009). Teachers do implicitly include some EF skills to support classroom management and academic content. This is often done by modeling the skill, but not explaining. This, however, is not sufficient for many students. Students struggling with classroom time management may exhibit consistent struggles with gauging the amount of time required for a task, needing more time to complete assignments than their peers, is often surprised to learn about upcoming due dates, and can tell time but often unaware what time it is and surprised when checking the time (Kaufman, 2010). Developing and delivering lessons which include explicitly teaching writing strategies has been studied with middle school students.

A quasi-experimental study by De La Paz and Graham (2002) investigated explicitly teaching writing strategies to middle school students. Five seventh and eighth grade teachers working with a total of fifty-eight students participated. There was an emphasis on planning, based on observations that students commonly started writing almost immediately after being assigned the task. Writing requires complex cognitive skills to plan, access ideas from long-term memory (LTM), develop and organize concepts, create a draft, reconceptualize and review plans. Working on the assumption that teachers can help students become more proficient writers by directly or explicitly teaching them the processes needed for good writing, De La Paz and Graham (2002) compared groups of students. One group received explicit teaching and the other did not. Essays were analyzed in terms of planning, length, vocabulary, and quality. The results were that explicit teaching of writing skills had a positive result. Based on the results of this study, one may consider if time management skills can be explicitly taught with a positive result for students. The skills needed for planning a well-written essay have a similar planning element to time management.

An alternative perspective comes from natural learning. Natural learning is an approach where meaningful and authentic contexts should be used to teach strategies, skills and knowledge (De La Paz & Graham, 2002). In the case of writing, however, studies have shown that extensive structures and explicit instruction benefits students (De La Paz & Graham, 2002).

'Most students genuinely want to succeed in school' with perceived 'laziness' a behaviour driven by a lack of skill (Kaufman, 2010:175). A successful student produces what the teacher requires in the manner prescribed and involves knowledge and using combinations of executive skills. Executive cueing is mostly left to the students themselves, whereas other processes of

learning in the classroom are supported by teachers (McCloskey et al., 2009). For many students, success can be greatly influenced by the executive skill requirements that the teacher builds into the assignment to demonstrate what the students have learned (McCloskey, et al., 2009). There are many EF skills required for student time management in completing tasks in class. Teachers may observe behaviours associated with weak executive skills in some students, as seen in Table 2, adapted from McCloskey et al (2009:250). Identifying specific student EF skill weaknesses may be a strategy for developing individual support for students.

Executive Skill **Self-Regulation Cue**	**Observable Student Behaviour Description**
Initiate	Difficulty or slow in starting tasks
Gauge	Difficulty estimating the size of tasks
Modulate	Difficulty in regulating intensity of work
Sustain	Difficulty in working for sustained periods
Foresee/Plan	Difficulty anticipating what's coming up or what needs to be done next
Pace	Difficulty in adjusting work effort to meet time requirements
Time	Difficulty with judging the passage of time or estimating the time required
Monitory	Difficulty in keeping track of tasks

TABLE 2 EXECUTIVE SKILLS ASSOCIATED WITH OBSERVABLE BEHAVIOURS FOR WEAK EF SKILLS

EF skills are developed over time (McCloskey et al., 2009) with full development not occurring until late adolescence into early adulthood (Kaufman, 2010). Individually, EF skills do not progress at the same rate. It has been observed that 'EF development can change from time to time in a given child' (McCloskey et al., 2009:70). Within the classroom setting, EF development is not physically apparent and not always easy to observe which can make it difficult to address. Whereas physical development is apparent and considered out of the student's control, EF capacities (brain

development) is often thought to be within student control (McCloskey et al., 2009). This is a misconception that can influence teacher perceptions of students in their classroom which may be expressed during research interviews in their expectations of students. To achieve academic success, students are expected to be competent in various EF-dependent capabilities often labeled responsibility, self-organization, self-direction, self-discipline (McCloskey et al., 2009). Connecting these ideas, the repetitive use of the word 'self' reinforces this perception that these behaviours are within the student's control, as opposed to being 'under development' as part of their overall cognitive and physical growth.

Executive skills in daily life take more conscious effort for children and teenagers than with adults and need to be practiced both in and out of the classroom. This practice for children promotes brain development that supports EF skills for later in life (Dawson & Guare, 2009). Some students have strong EF skills across the board, and some are consistently weak, but it is common for a mixture of strong and weak skills. For example, in middle school, some students can effectively plan, organize and execute a one-minute task, however, they are unable to do the same for a long-term project. This may be explained by different abilities in self-regulation versus self-determination (McCloskey et al., 2009). For students with mixed EF abilities, students may be able to use a strength in one area to support a weakness in another (Dawson & Guare, 2009).

Teachers can support and develop student executive skills, including time management by teaching these skills, as opposed to expecting the student to 'acquire them through observation or osmosis' (Dawson & Guare, 2009:84). Students regularly struggling with executive skills benefit from explicit, highly structured instruction which makes new information easier to identify and organize which reduces the amount of mental energy (Kaufman, 2010). In the context of this research, the reduction of mental energy can be viewed as a reduced load on working memory (WM) allowing more WM to be used for content learning. For students who show signs of significant WM impairment, efforts should be made to lower the simultaneous processing load (Kaufman, 2010). For example, using a visual depiction of elapsed time, such as a clock, can be used as a support (Dawson & Guare, 2009). The concepts of WM and cognitive load will be discussed later (Chapters 2.9 and 2.10).

There are contradicting thoughts about teaching EF skills across curriculum areas. Kaufman (2010:80) states that 'the functional impact of various EF weaknesses is setting dependent.' This is supported by teacher observations that students may exhibit EF struggles in some subject areas and with some teachers but not with others (McCloskey et al., 2009). Juvonen et al (2004) supports

interdisciplinary curriculum to facilitate critical thinking and improve understanding of connections and relationships between topic areas. Regarding time management, increased understanding of how different teachers include it, both implicitly and explicitly, into their students' classroom experiences may better inform how to support struggling students. Since time management skills are needed across curriculum areas, indeed in most, if not all, of a student's day, an interdisciplinary approach may be preferred.

It is acknowledged that the transition to middle school causes anxiety and challenges to students within the 11–14-year range, which is a time of significant developmental changes both hormonal and physical. This is compounded by the perception of students, and parents, that middle school is more impersonal and intimidating than earlier school experiences (Cauley & Jovanovich, 2006). Building on the understanding that these students are in a unique period of rapid growth in the areas of their academic capabilities and expectations, cognitive and frontal lobe development, as well hormonal and physical changes, make understanding both their and their teachers' perception of time management skills and expectation an area of research interest.

CHAPTER 2.7 - MOTIVATION

'From a teacher's perspective, well-motivated children are a joy to teach' (Benthem & Iles, 2018:2).

Research by Larson (2001) showed that students are often bored during schoolwork, including high achieving honors students. Understanding student motivation spans the fields of both education and psychology and is complex (Benthem & Iles, 2018). Motivation does not have an agreed definition. It is widely agreed that it concerns human behaviour in terms of direction and magnitude including the choice of action, persistence regarding that action and the amount of effort spent (Dörnyei & Ushioda, 2021). Cognitive performance is impacted by motivation (Mahy et al, 2014). Motivation and executive function activities are well aligned when compared. Table 3 compares similar tasks from motivation and executive function perspectives.

Motivation Mental Process	Executive Function Skill
Initial Planning	Planning and Strategizing
Goal Setting	Goal Setting and Prioritization
Intention Formation	Focus
Task Generation	Task initiation
Action Implementation	Sustained Attention and Task Persistence
Action Control	Self-regulation
Outcome evaluation	Task Completion and Metacognition

TABLE 3 MOTIVATION MENTAL PROCESSES COMPARED TO EXECUTIVE FUNCTION SKILLS

Research in motivation has changed over time. Prior to the mid-20th century, there was emphasis on the emotions of the individual. This contrasts with the second half of the 20th century with a focus on conscious cognitive processes (Dörnyei & Ushioda, 2021). Motivational research looking at both emotional and cognitive emphasizes its complexity. Motivation of students in a classroom include complexities such as competing attentional demands, activities, and goals, both academic and social (Dörnyei & Ushioda, 2021). As articulated by Dörnyei & Ushioda (2021:7), 'No theory of motivation is likely to grasp the whole picture.' There are several theories providing guidance for discussing student motivation.

Current motivation cognitive theories focus on an individual's behaviour affected by thoughts, beliefs and information-processing (Dörnyei & Ushioda, 2021). Of current theories, the self-determination theory (SDT) is the most dominant framework in motivational psychology (Vallerand, 2021; Dörnyei & Ushioda, 2021). First articulated by Deci & Ryan, the SDT has been developing for more than four decades (Deci & Ryan, 1985; Ryan et al., 2021; Vallerand, 2021). This theory examines a continuum of motivation in terms of intrinsic (internal), extrinsic (external) and to a lesser degree amotivation or the lack of motivation (Ryan et al., 2021). A connection can be drawn between SDT and EF regarding self-regulation and self-determination. Self-regulation is seen as a category of extrinsic motivation (Ryan et al., 2021), as well as a category in EF skills (McCloskey et al., 2009). Referring to the focus of this paper, in middle school classrooms, all three types of motivation may present. For example, one source of extrinsic motivation, external regulation (Ryan et al., 2021), being the teacher-student hierarchical dynamic. Another example is students seeking approval from their peers or introjection as extrinsic motivation (Ryan et al., 2021). In the classroom goals and behaviours may be socialized and then internalized. This internalization is more likely

when the fundamental human needs of autonomy, competence and relatedness are present (Dörnyei & Ushioda, 2021). SDT, as a theory, is a useful tool when looking at time management in the classroom.

Student motivation can also be viewed though Atkinson's expectancy-value theory (EVT) (Atkinson, 1957) stated simply as motivation equals expectancy of success multiplied by the value of the reward (Dörnyei & Ushioda, 2021). This theory has been applied to education and student achievement motivation (Wigfield & Eccles, 2000). The value students place on their academic studies and achievements affect their expectancy and motivation (Loh, 2019; Wigfield & Eccles, 2000). A student's expectation of succeeding can be supported by preparation, availability of support from teachers, the structure of how the task is presented and making assessment criteria clear (Dörnyei & Ushioda, 2021). Students need to believe that the strategies combined with their effort will be beneficial in terms of academic performance (Meltzer et al., 2001). Applying this to middle school classrooms, teachers can affect all four of these activities, with the students themselves best able to contribute to preparation through participation in class and mindful completion of homework.

Attribution theory is frequently used today continuing from its dominance as a model of student motivation in the 1980s. It is based on Heider (1958) with the assumption that humans look at the causes of outcomes and use this perception to inform their behaviour (Weiner, 2010). Ability, effort, task difficulty and luck are the four determinants of outcomes (Weiner, 2010). The outcomes of the attribution theory can be compared to meeting goals which is the focus of goal-setting theory. Goals are characterized by specificity, difficulty and commitment (Locke & Latham, 2019; Dörnyei & Ushioda, 2021). Goal-setting theory can be articulated in terms of motivating time management. Dörnyei and Ushioda (2021) do so by stating, '...whereas proximal subgoals break down the task into a series of more manageable targets; the shorter deadline for these subgoals also generates greater time pressure and thus a stronger need to act on the goal' (Dörnyei & Ushioda, 2021:26). Applying this to time management, students with strong time management skills may be able to create subtasks (subgoals) more effectively and be motivated to start, relieving undue time pressure.

The motivation theories discussed have focused on the student, an individual. School, however, is a community of students, teachers and staff. The environmental fit theory (Eccles & Midgely, 1989) posits that a mismatch between students' desires and opportunities within school or classroom contribute to decreased motivation (Eccles et al., 1993). Kiefer et al (2014) interviewed sixth through eighth graders (ages 11-14 years) along with teachers and one administrator and

found that teacher-student relationships, teacher expectations and instructional practices were perceived as important in supporting student motivation. Looking at the same age group, the socio-contextual factor of other students in terms of peer pressure is important to consider in the school and classroom environments. Peers become a larger influence on students especially as they transition to new schools and social situations, as well as developing identity and self-concept (Berndt & Keefe, 1995). Given favorable conditions, classrooms can foster motivation which exceeds the motivation of an individual student alone (Dörnyei & Ushioda, 2021). This applies to time management and the educational challenge to support motivation on both the classroom and student level.

From an educational point of view, understanding why students lack motivation may suggest strategies to change student behaviour (Bentham & Iles, 2018). A practical approach for teachers to consider is the use of student motivation profiles. Bentham and Iles (2018) created student profiles looking at academic self-concept, engagement, initiative, non-participatory behaviour and valuing school as a framework to discuss four profile types with the goal of creating a useful tool for teachers in providing interventions for different types of disengaged learners (Bentham & Iles, 2018). These profiles were developed with one primary and several secondary schools.

Cohen et al's (2020) study involved 651 students, mean age of 14 years (seventh through tenth graders), using the motivation mediation model which includes three basic higher order constructs of context, motivation, and action. Concentrating on teachers' positive and negative conditional regard which is commonly used by teachers to motivate and improve student academic performance on student agentic performance (Cohen et al., 2020). Agentic refers to being able to control one's own goals and actions and is similar to EF self-regulation cues, such as initiating, sustaining, pacing, judging time. Though a commonly used technique, teachers' conditional regard, both positive and negative, were seen to undermine students' agentic engagement. Conditional regard was seen as inhibiting students' psychological needs for autonomy and relatedness, two important psychosocial mechanisms in promoting adolescents' academic involvement and school-related outcomes (Cohen et al., 2020). The importance of students' perception of autonomy is consistent within SDT motivation theory. This research would suggest that some EF student success needs to be self-motivated.

By middle school, reading is required in most, if not all, academic classes. However, research indicates that reading motivation declines toward the end of primary school (Styck et al., 2020). Reading has both cognitive and motivation elements with most scientific literature focused primarily

on the cognitive factors (Styck et al., 2020). Citing a body of research, Styck (2020) discusses the relationship between reading motivation and reading achievement, including research showing that reading achievement is not significantly mediated by reading engagement or reading frequency. In these studies, motivation was a determining factor. Styck et al's research involved 731 sixth through eighth graders completing a Baylor Revision of the Motivation to Read Survey (B-MRS) to measure reading motivation. Using a 4-point ordinal rating scale, it measures two aspects of reading motivation. These measures are self-concept as a reader and the value of reading (Styck, 2020). The research's aim was to provide evidence that the B-MRS is a suitable tool for gauging middle school students' reading motivation which was supported by the data. In the broader context of academic success, this research is limited to the motivation to read. However, reading is a skill needed for both academic success and executive functioning of middle school students.

Procrastination can be viewed as the antithesis of motivation. It is the voluntary postponing a task or decision and has been studied from a personality characteristics perspective, but not much focused on neuropsychological associations (Rinaldi et al., 2021). The connection between procrastination and time management involves difficulties in organizing time, sustaining focus, learning from mistakes, and decision making which all involve the brain's frontal lobe (Rinaldi et al., 2021). As stated earlier, the frontal lobe is the area of the brain associated with EF skills. Rinaldi et al (2021) studied eighty-three undergraduate students using a series of diagnostic tests, including the Behavior Rating Inventory of Executive Functioning – Adult Version (BRIEF) and found a strong positive relationship between BRIEF scores and procrastination scores as measured by the Lay General Procrastination (LAY GP) scale. Rinaldi et al (2021:703) states,

> The results of this study are the first of their kind that provide empirical evidence implicating measurable cognitive difficulties as a potential contributor to procrastination...These results will hopefully serve as a guide to identify individuals who struggle greatly with procrastination and direct them towards services that can help with the areas such as study skills, time management, problem solving strategies.

In other words, this study implies that strengthening students' executive function skills, including time management, may also reduce procrastination. Nasrullah & Khan (2015) support this stating, '…students will not be able to organize duties according to their priorities, so they get distracted easily, ending up procrastinating,' (Nasrullah & Khan, 2015:67). Both studies involved university aged students but provides a basis for looking at a connect between time management skills and procrastination in middle school students. Specifically, 'to assist with time management and lessen

the potentially deleterious effects of chronic procrastination' (Rinaldi et al., 2021:705). The 'deleterious effects' of procrastination or a lack of motivation may contribute to stress and anxiety.

CHAPTER 2.8 - STUDENTS AND STRESS

> 'As educators, we know that we are not supposed to underestimate the influence of students' anxiety' (Jones et al., 2019:13).

Teachers work with classrooms of students every day who may experience stress or anxiety within the school environment or bring with them known or unknown stressors from outside. Anxiety, specifically state anxiety, is a negative emotional and motivational state which occurs in threatening' situations and depends on the situation (situational) (Eysenck et al., 2007). As noted previously (Chapter 2.5), middle school is a time of transition, and these changes can be sources of anxiety for some students. Tramonte and Willms (2010), using Csikszentmihalyi's flow theory, explored the prevalence of stress in students grades six through twelve (ages 11-18 years). Their findings show that less than half of participating students felt confident in their skills and challenges in class, in a state of flow as described by Csikszentmihalyi (Csikszentmihalyi, 1997). Anxiety was much more likely to occur in students who were not confident of their skills (Tramonte & Willms, 2010). In a different study focused on seventh and eighth graders, many expressed, 'feeling overwhelmed with the new expectations or helplessness as to how to manage a balance between schoolwork, extracurricular activities and desired free time' (Jones et al., 2019:4). The action research study looked at academics-related anxiety focused on test anxiety. Tests are a common example of tasks students need to complete within a teacher specified length of time. Tests are also a time when students experience increased cognitive load.

There has been research focused on EF and anxiety. Alfonso and Lonigan (2021) framed their research in the context of attention control theory (ACT) looking for relationships between EF and trait anxiety. ACT addresses anxiety and cognition and is an extension of Eysenck and Calvo (1992) processing efficiency theory predicting that anxiety affects processing efficiently more than performance effectiveness (Eysenck et al., 2007). ACT posits that anxiety impairs the ratio between performance and cognitive effort (Eysenck et al., 2007). For their work, Alfonso and Lonigan (2021) explain the mechanism as:

> Anxiety reduces the influence of the goal-directed attentional system and increases the influence of the stimulus-driven attentional system, thereby, reducing attentional control. Because IC and SH require a high degree of attentional control, the theory postulates that anxiety impairs inhibition and SH more than it impairs WM. Thus, it is possible that anxiety decreases academic achievement through reduced attention control (Alfonso & Lonigan, 2021:2).

This focuses on the three main elements of EF described earlier, inhibitory control (IC), working memory (WM), and attention shifting (SH), (Diamond, 2012; Miyaki et al., 2000) and a possible relationship with anxiety. A clarification is helpful in that this study looked at 'trait anxiety' which refers to a personality trait or predisposition for anxiety whereas 'state anxiety' are the feelings produced by distress (Alfonso & Lonigan, 2021). Though not directly looking at time management, IC, SH and WM constitute EF time management skills. This study involved 174 middle school students (mean age 13 years) in the U.S. Their conclusions regarding anxiety's effects were characterized by the intensity of the anxiety. Moderate anxiety levels can improve academic success, while performance decreased when anxiety increased the cognitive effort needed (Alfonso & Lonigan, 2021). Owens et al (2014) similarly found improvement with moderate levels of stress. In a study by Angelidis et al (2019) looking specifically at state anxiety and test taking, the stress group had slower WM performance compared to the control group (Angelidis et al., 2019). These finding are also in line with ACT (Angelidis et al., 2019). Building on this idea, anxiety may be viewed as an extraneous cognitive load. Increases in extraneous loads leave less resources for WM and other cognitive activities needed for learning which will be discussed later in Chapter 2.10.

Two earlier related research projects were conducted by Owen et al (2012) and Owens et al (2014) involving middle school aged students. First, looking at thirty-one children ages 12-13 years, Owens et al (2012) found that higher levels of anxiety were related to lower academic performance (Owens et al., 2012) The second study (Owens et al., 2014) involved ninety-six students ages 12-14 years finding that anxiety and WM explained test performance variances. These studies looked at only one part of EF, WM, and is not as inclusive as the Alfonso and Lonigan (2021) study looking at IC, SH and WM. Taken together, these studies support the need to consider anxiety when looking at student difficulties with time management.

School engagement is another area of research related to EF in that it has elements of behavioural, emotional, and cognitive engagement (Raufelder et al., 2014). A study by Raufelder et al (2014) explored student self-assessed perceived stress, self-determination, and school engagement. Discussed earlier in Chapter 2.7, the self-determination theory (SDT), often used in

scholastic motivation studies, is a broad framework to understand motivation and informed this study. SDT explores feelings of self-determination based on one's actions (autonomy), feeling supported in an environment (relatedness), and the need for feeling able to work in a competent way (competence) (Raufelder et al., 2014). The elements of the SDT framework are similar to EF skills in enabling students to accomplish schoolwork in a timely manner. A larger study of 1088 students, ages 11-15 years old (mean age = 14 years), was based on a questionnaire including the variables of perceived stress, self-determination and school engagement. Self-reported information was of interest to gain insight on the students' perceptions of themselves (Raufelder et al., 2014). The study found that stress was negatively correlated with school engagement and the more students perceived themselves under stress, the less perceived self-determination they possessed (Raufelder et al., 2014). The study went on to say that student stress can be prevented or interventions made at two levels: classroom and individual. One suggestion is for teachers to be instructed in techniques and tools to support student autonomy and competence (Raufelder et al., 2014). Competence in time management, it could be hypothesized, would support students' feelings of autonomy and competence and reducing stress.

Time management can also affect stress levels of students (Nasrullah & Khan, 2015). In research related to time management as part of EF skills, Kelly (2003) investigated worry and time management. This study of 130 undergraduate students in the U.S. quantitively looked at results from three tests, the Student Worry Scale, the Time Structure Questionnaire, and the Time Management Behavior Scale. The results showed that worry negatively relates to time structures and purpose (Kelly, 2003). This may be rephrased as being busy, or structuring and filling time with activities, can reduce worry. Regarding time management techniques, they showed little effect on worry (Kelly, 2003). Relating to time management, such activities as making lists, prioritization, organizing one's time are included in these techniques. Kelly goes on to say about the relationship between worry and time use, that it 'may involve perception of time more than actual time-related behaviors' (Kelly, 2003:1124). The effect of worry on the perception of time has been explored by Sarigiannidis et al (2020). Working off the idea that worry takes up WM memory resources, thus creating a cognitive load, which are needed for time perception, they found that time perception, or the ability to discriminate between different intervals of time, was not impaired by worry (Sarigiannidis et al., 2020). They suggested that there may be a unique mechanism for time perception that does not fit within SDT (Sarigiannidis et al., 2020). Perceiving the passage of time is related to time management as a classroom skill, as well as other cognitive processes.

These studies look at anxiety induced by activities within a classroom. Teachers also need to be aware that some students' EF skills are negatively affected by trauma experienced outside the classroom (Barr, 2018; Chen et al, 2019; Op den Kedler et al, 2018; Shonkoff et al, 2011). Three key research findings are that EF skills are crucial for early development, they are affected by natural normative differences, differences in individual development, and impacted by adverse situations, and interventions have been found to support development (Skonkoff et al, 2011). Trauma may take many forms and is thought to influence the neurobiological mechanisms supporting EF skills (Barr, 2018; Op den Kelder, 2018). Violence and poverty are two areas and have been shown to impact EF skills, particularly IC and WM (Chen et al, 2019). In the U.S., EF deficits in childhood and adolescence have been linked to poverty (Barr, 2018; Chen et al, 2019; Wolf & Suntheimer, 2019). One explanation for this may be that these children have less exposure to resources and experiences which build EF skills (Shonkoff et al, 2011). The impact of poverty is significant and one which many teachers will encounter with students. Chen et al's (2019) findings suggest, 'that even in populations exposed to substantial violence and fear, poverty is uniquely associated with EF development' (Chen et al, 2019:1863). For teachers, these EF deficits may be mistaken for student inattention (Terrasi & de Galarce, 2017), procrastination or lack of motivation.

CHAPTER 2.9 - COGNITIVE CONSIDERATIONS: MEMORY

'Working memory...is crucial for making sense of anything that unfolds over time, for that requires holding in mind what happened earlier and relating it to what is happening now'
(Diamond, 2012:336).

Building on the understanding that students ages 11-14 years are experiencing a time of rapid cognitive growth, working memory (WM), long-term memory (LTM) and prospective memory (PM) are all involved. Working memory is a commonly used term, but often used quite differently in different research communities (Miyake & Shah, 2004). Commonly accepted elements of WM are that it refers to the 'moment-to-moment' processing, on-line cognition, and maintenance of information as observed both in research laboratories and everyday life (Miyake & Shah, 2004; McCabe et al., 2010). It is a vital interface between perception and memory, as well as between attention and action (Baddeley, 2007). Working memory, is thought to be composed of multiple channels or processors, such as visual and auditory, not just one structure (Leahy & Sweller, 2016). Verbal WM processes words, numbers and letters, while visuospatial processes figures and special information (Op den Kedler, 2018). Two storage buffers are thought to be involved in WM. These

are temporarily store visual-spatial and auditory information, as well as executive function which coordinate these systems (Baddeley, 2007; Voigt, 2014). There is agreement that WM is involved when processing new information and it has a very limited capacity, with exactly how limited open to discussion (Sweller et al., 2011). In referring to WM in this thesis, a definition based on the multiple-component model (Baddeley & Logie, 1999) is used.

> Working memory comprises those functional components of cognition that allow humans to comprehend and mentally represent their immediate environment, to retain information about their immediate past experience, to support the acquisition of new knowledge, to solve problems, and to formulate, relate and act on current goals (Miyake & Shah, 2004:28).

Regardless of the exact definition, it is hard to overestimate the role of WM in students' learning. Simultaneous processing is what differentiates WM from simple recall (Kaufman, 2010) and helps explain its complexity. Working memory is involved in the central executive part of the brain's prefrontal cortex (Garnett, 2020).

Research is inconclusive regarding the limits of working memory. There is general agreement that it is very limited (Kaufman, 2020). Miller (1956) indicated that typical adults can store about seven bits of information (plus or minus two). Working memory capacity for children can vary significantly due to their level of development, neurobiology based on their DNA and experiences (Kaufman, 2010). Working memory varies between individuals and is affected by emotions such as anxiety discussed earlier (Chapter 2.8) (Perry et al, 2021). In early development, it is believed that nonverbal WM develops before verbal as evidence by these skills emerging prior to language skills (Dawson & Guare, 2009). There is evidence of steady increase of WM between the ages of 6-15 years (Mahy et al., 2014), with WM seeming to follow a linear development from preschool to adolescence with switching of complex tasks maturing by middle adolescence (Op den Kedler, 2018). Working memory capacity and EF both have the same underlying attention component (McCabe et al., 2010). Working memory can be disrupted by external stimuli or task-unrelated thoughts (McVay & Kane, 2012). Applying this to time management, WM is needed to actively maintain intention to constantly monitor time without external distraction (Aberle & Kliegel, 2010). In the context of EF in the classroom, teachers need to utilize WM efficiently to maximize learning.

Working memory draws from long-term memory (LTM). Long-term memory is knowledge organized in cognitive schema and vary in complexity (de Bruin & van Merriënboer, 2017). Long-term memory is not just recalling events or information from the past but is central to human

cognition and required for higher-level cognition such as problem solving and thinking (Sweller et al., 2011). The major function of LTM is to store complex, integrated information to be used to process incoming information and respond appropriately (Suggate, 2012). Information saved in LTM can be easily reused by WM (Sweller et al., 2019; Uus et al 2020). Learned skills, such as reading a clock, are stored in LTM.

Along with WM and LTM, prospective memory (PM) is important in students' time management. Prospective memory can be described as remembering to do a future action at the right time while actively doing something else (Einstein & McDaniel, 2005). Simply put, PM is remembering to do something in the future (Ceci & Bronfenbrenner, 1985). As students progress through school, the importance of PM increases as they are expected to become more independent in their actions (Mahy et al., 2014). The development of PM skills are important because they support the cognitive skills needed to perform everyday tasks (Leigh & Marcovitch, 2014) such as those required by students. Working memory is hypothesized to support PM implying better WM allows better PM (Anderson et al., 2019). Children as young as ten years old can use fairly sophisticated cognitive strategies for PM (Ceci & Bronfenbrenner, 1985). There are two types of PM, time-based and event-based. Time-based deals with executing an action at a specific time or after a certain amount of time has passed, whereas event-based uses a certain event as the cue to carry out a specific action (Mahy et al., 2014; Horn, 2015). Much of the research on children has been event-based due to difficulties with time perception and clock reading with younger children. Time-based research has traditionally been done with older children because of their increased awareness of time and ability to read a clock. Research on time-based PM has looked at two types of time monitoring strategies of adaptive (internal) and simple (external, such as a clock) (Voigt et al., 2014). Time-based PM is important in executive skills because it relies more on monitoring the external environment and self-intentions (Mahy et al., 2014). It involves executive functions, monitoring the time, for the self-initiation of a delayed action, for example (Mackinlay et al., 2009). Though event-based PM is involved in time management, for example starting a task once another task is finished, time-based PM is more involved in monitoring a task to be completed within a specified time and using clocks as tools which is the focus of this research. A common PM research methodology is to ask participants to do an action when a specific stimulus is presented or a specificized amount of time has passed (Mahy et al., 2014). For time management in this research, a different scenario was explored where students are given a specific task to be completed in a specific amount of time.

Time-based PM refers to the ability to remember to do a task after a specific period of time and is associated with WM (Aberle & Kliegel, 2010; Voigt et al., 2014). In contrast with event-based

PM, time-based is seen to be more resource intensive due to the time monitoring required (Aberle & Kliegel, 2010). Nigro et al (2002) reported that 7–11-year olds' performance decreased with a time delay of fifteen minutes compared to ten minutes with time-based tasks, but not event-based (Nigro et al., 2002; Mahy et al., 2014). Between 7-12 years, children demonstrate successful completion of time-based tasks, whereas younger children having not yet developed these skills (Henry et al., 2014). Older children tend to use more strategic monitoring than younger ones which may also be explained by cognitive resources, such as planning and task switching (Mackinlay et al., 2009). It is acknowledged that PM performance increases with age (Redshaw et al., 2018).

Prospective memory and EF, when looked at broadly, develop at about the same time which may indicate that development of EF is related to similar development in PM (Mahy et al., 2014). Executive function is required for a PM action to be carried out (Mahy et al., 2014). Mahy et al (2014) suggest that PM development lags EF development with its associated prefrontal brain development predicting that more developed EF skills facilitate better PM performance. Having established that EF and PM are associated, it is possible to consider that a requirement to remember to do something in the future creates a cognitive load and that load affects a student's EF time management proficiency. The concept of managing and structuring cognitive load has been used to inform instructional designs.

CHAPTER 2.10 - COGNITIVE CONSIDERATIONS: PERCEPTION

'So perception is the end product of complex processes, many of which take place out of awareness' (Butler & McManus, 2000:27).

Perception can simply be defined as what is experienced with our senses (Rogers, 2017). This definition does not address the complexity of the sensory input involved and the mental interpretation. The concept of perception is also used for these processes (Rogers, 2017). Reality can be described as an individual, human construct and is limited by our sense organs (Butler & McManus, 2000). This is an active, reflective process allowing individuals to create their perception of reality. (Butler & McManus, 2000). The human brain has a limited capacity and makes choices to direct attention appropriately, filtering out what does not matter at that moment (Butler & McManus), 2000). This relates to the limited capacity of WM as noted previously and is an

important factor when looking at instructional practices based on cognitive load theory discussed next.

The initial 'simple' definition above relates sensory input and perception. The perception of time, however, is different in that it exists in the mind with no related sensory input or experience (Gallistel, 1996). A 'simple' definition for time perception is difficult. As Burdick states, 'If scientist agree on anything, it is that nobody knows enough about time and that this lack of knowledge is surprising given how pervasive and integral time is to our lives', (Burdick, 2017:xviii). Time is not a thing but a cognitive construct that is experienced by the individual and provides structure to organize behaviours (Kelly, 2002). Temporal perception also has no universally accepted theory, but the concept of an internal clock, though simplistic, is helpful (Wittmann, 201).

The term 'internal clock' is often used for intuitively identifying the time or how much time has passed. Wittmann notes that 'despite 150 years of experimental research on time, there is still no consensus about how the nature of our capacity for perceiving and discriminating temporal duration' works (Wittmann, 2017). What we do know is that time can be perceived to pass quickly without notice or slowly when bored or waiting (Wittmann, 2017). Time passing quickly without notice is described by Csikszentmihalyi's concept of flow. Flow is a positive psychological state when time seems to go by without notice and occurs when a person is using an above average skill applied to a challenging activity (Csikszentmihalyi, 1977; Beard, 2014). Flow can be achieved with different types of activities, including those in classroom. Novel activities seem to last longer due to the influence of increased demands on thinking, perception, and emotions (Wittmann, 2017). Why time is perceived to vary is not completely understood. It is believed that if a stimulus lasts longer than three seconds, it becomes too long to be perceived as a 'temporal whole' and short-term memory must be activated for the duration to be assessed (Wittmann, 2017:71). This use of short-term memory, or working memory, is a cognitive load. Considering the complexity of temporal, or time perception, it is evident that what is biologically primary and secondary knowledge is not clearly delineated.

As stated, Csikszentmihaly's concept of flow describes conditions when time is perceived to go faster, a type of temporal perception distortion. In a state of flow, people also experience intense focus or concentration, loss of reflective self-consciousness, gain a send of control, and find the experience intrinsically rewarding (Nakamura & Csikszentmihaly, 2016). Time is perceived as an essential factor of life with the quality of time deemed important in terms of decisions on how to use it wisely (Fischman & Barendsen, 2015). The concept of flow is useful for teachers and students related to classroom engagement to optimize learning activities (Beard, 2015; Cavanagh & Sharnoff,

2015). The capabilities-expectations model of student engagement is based flow concepts of flow occurring when a high ability of skills are engaged in a challenging activity (Cavanagh & Sharnoff, 2015). In the classroom setting, the challenge is to encourage deep passion for learning and flow in lessons without losing sight of time (temporal distortion effect) and goals of finishing tasks on time.

This research involves several different aspects of perception. Teachers and students share their perceptions of their classrooms experiences and themselves focusing on time management. This includes what is perceived in terms of importance, expectations, and proficiency. Also explored are perceptions of time compared between teachers and students. Due to the amount of time students spend in school, their perceptions and experiences about their school environment are vital to their learning process (Fraser, 2007). In school, and elsewhere, some perception happens without realizing, called subliminal perception (Butler & McManus, 2000). Subliminal perception is not within an individual's control. However, paying attention, a phrase frequently used in a classroom, is a way individuals select what gets in their minds and this 'attention' can be focused on more than one thing at a time (Butler & McManus, 2000). This is important to remember when evaluating instructional practices in the class in terms of how time management interact with the process of learning academic content. What a person actually perceives is a combination of perception and attention which can be influence by both external and internal factors (Butler & McManus, 2000). Factors which have been found to interfere with perception include, 'similarity between stimuli, difficulty of the task, lack of skill or practice, distress or worry, preoccupation or absent-mindedness, drugs, boredom, and sensory habituation (Butler & McManus, 2000:23). Most, if not all, of these factors can be found in middle school classrooms.

Perception is an individual experience, as is learning. Constructivist learning theories are based on the "now commonplace" idea that individual learners actively construct knowledge (Prawat & Floden, 1994:37). This knowledge and understanding are built on what the student already knows causing changes, adaptations and invention of new ideas (Aubrey & Riley, 2019). As practiced in the classroom, teachers support students learning by providing authentic and real-world activities (Kingir et al, 2013). This can be compared to Neisser's cognitive psychology view that schema built by past experiences create expectations about objects and events, using these schemas to anticipate what is needed (Butler & McManus, 2000). Building or constructing long-term memory schema is one of the primary goals of school.

Constructivist theories can be described as cognitive constructivism and social constructivism. Cognitive constructivism emphasizes the student's role in understanding of their world and the active role of individuals in the construction of knowledge (Kingir et al, 2013). In

terms of theorists, Piaget is associated with cognitive constructivism (Aubrey & Riley, 2019) focused on the individual. Vygotsky's social constructivism focuses on social interaction, including language, discourse, cultural aspects and social background, as crucial aspects in constructing learning (Aubery & Riley, 2019). Dewey and Bruner were influenced by Vygotsky's thinking (Aubery & Riley, 2019). The use of both culture and environment to understand the world can be applied to the time management in the classroom for students understanding the classroom expectations of completing work efficiently. In this sense, it is socially constructed in the culture of the classroom as created by teachers and students. It is the cognitive construct used to organize behaviours of students in the classroom. Individual strategies for time management may be more aligned with cognitive constructivist school of thought. Both are valuable in the classroom and both benefit from teacher-student collaborations.

The perception of time being a cognitive construct presents challenges to teaching time management. Looking at types of knowledge, a perception of time may be thought as tacit. Tacit knowledge is unarticulated and tied to the senses in movement skills and accumulated experiences (Silby & Watts, 2015). This is contrasted with explicit knowledge which is easily articulated in words, writing and diagrams and implicit may be modeled, but not articulated, however it can be (Silby & Watts, 2015). In education, tacit knowledge plays a dominant role in the knowledge system and values for teachers and students and enables teachers and students to function in the classroom environment (Silby & Watts, 2015). Tacit knowledge can be described as having three main features. These are it is gained without much direct input from others, is procedural in nature and utilizing the knowledge is goal oriented (Elliott et al, 2011). Research in making tacit knowledge explicit shows that it requires the articulation of personal thoughts and ideas, subjective insights, and prior knowledge by strategies such as 'think aloud' while modeling by teachers and students (Silby & Watts, 2015). Linking this to social constructivism, the co-construction between teacher and students, making tacit knowledge more explicit, builds on students existing knowledge base creating new knowledge. This is supported by Silby's and Watts' (2015) research outcome that, 'tacit knowledge…relies a great deal on the relationship between children's' prior knowledge and conceptual understanding the ways in which this translates into action…' (Silby & Watts, 2015:809).

CHAPTER 2.11 - COGNITIVE LOAD THEORY

'The ultimate ambition is to develop well-constructed coherent and detailed schema within our pupil's minds' (Garnett, 2020:8).

Cognitive load theory (CLT) is a framework which uses cognitive and information structures with an appreciation for size limitations of WM to inform instructional design (Leah & Sweller, 2016). CLT is an instructional theory with the goal of enabling teachers to deliver quality instruction (Garnett, 2020). CLT is based on hundreds of randomized controlled studies with participants ranging from K-12 education and adults (Garnett, 2020). It is based on the understanding of human cognitive architecture specifically the size limits of WM, compared to the virtually 'unlimited' long-term memory (LTM) housing schema, or packets of information (Gerjets et al., 2009:44). The theory describes three types of loads (intrinsic, extraneous, germane) and how to manage these loads to maximize student learning. Intrinsic and extraneous loads are thought to sufficiently provide a framework for CLT (Kalyuga, 2011; Pope, 2020). Sweller, considered the originator of CLT, has deemphasized germane load by suggesting that it redistributes WM resources from extraneous load functions to learning related functions (Garnett, 2020; Lovell, 2020; Sweller et al., 2019).

Generally speaking, the cognitive load is the load a specific task imposes on a learner's cognitive system and is created by the complexity and interaction between the environment, learner and the task (Königschulte, 2015; Lovell, 2020; Paas & Ayres, 2014). Ricker & Cowen (2018) note that time is involved due to the interacting elements. Within the overall cognitive load, intrinsic load is the material being learned, particularly its difficulty or complexity (Garnett, 2020; Leah & Sweller, 2016; Sweller, 2012). It is the inherent component of the information and influenced by the number of elements because these elements are managed simultaneously in WM (Sweller, 2016). Extraneous load is created by how material is taught or presented to students (Garnett, 2020; Lovell, 2020). It is the cognitive load created by instructional form, such as length and complexity, and can be altered (Leahy & Sweller, 2016). It is the extraneous load that teachers can influence in their classroom practices by helping students not to be cognitively overloaded (Leahy & Sweller, 2016; Uus et al., 2020). This would include extraneous loads imposed by time management.

Cognitive load theory is primarily applied to biologically secondary knowledge since it is used to develop instructional practices (Lovell, 2020). Since there is 'little evidence' that biologically primary knowledge can be taught, the instructional focus is on biologically secondary knowledge (Sweller et al., 2011; Lovell, 2020). However, there is a discussion that by teaching biological

secondary knowledge, it is a 'pathway to helping people improve in the biologically primary domain of problem solving' (Lovell, 2020:153). There is general acceptance that biologically primary skills can be further developed given the right conditions (Lovell, 2020). Building on this idea, teaching elements of time management which are biologically secondary may support the continued development of elements in the cognition of time which is biologically primary.

In exploring time management for areas where CLT could inform classroom practice, the presentation of verbal or visual reminders can be explored. Considering this idea in general, complex or lengthy material may benefit from being written rather than spoken due to WM limits (Leahy & Sweller, 2016). This is based on the understanding that WM has two components, visual/spatial and auditory (EEF, 2021). This is termed the transient information effect and occurs when written instruction are replaced by spoken instructions and has been found to decrease learning. This decrease in learning is due to the spoken instructions not remaining in WM long enough to be understood or acted upon (Leahy & Sweller 2016; Lovell, 2020). This is contrasted with dual-coding where both verbal and non-verbal information are used (EEF, 2021). For time management, this may have implications for students as to whether teachers verbally provide time requirements or restrictions to students or use a visual tool such as a clock or countdown timer or both.

Another instructional application is the split-attention effect described as a situation in which a student's attention is divided between two or more sources of information separated either by space or time that the students need to integrate for learning to occur (EEF, 2021; Sweller et al., 2011; Lovell, 2020). Split attention is important in informing instruction design. There is a heavy extraneous cognitive load imposed when holding the separated information in WM which reduces learning (Sweller et al., 2011). Many existing educational materials, such as textbooks, contain material which may overload some student's WM due to the split-attention (EEF, 2021). For time management implications, when and how teachers present due dates, finish times, and/or subtasks may be improved to lessen the cognitive load on working memory to figure out if they are on track to finish on time.

The third instructional application discussed here is worked examples. Worked examples, proving step-by-step solutions to a problem, is a mathematics instruction pedagogy which is well established and often used (EEF, 2021; Lovell, 2020). For the past three decades, CLT-based research on worked examples has been 'very robust' (Sweller et al., 2011:108). Though these studies have been for the subjects of math and science only (EEF, 2021). Requiring students to solve

problems involving new concepts creates extraneous load and decreases learning (Sweller et al., 2011). Worked examples, however, provide students with problem-solving schema stored in long-term memory which can be used to solve related problems. The schemata are created as students are presented with step-by-step or part-by-part demonstration making clear what the finished task entails (EEF, 2021). This approach imposes a lower WM load compared to solving problems using means-ends search (Sweller et al., 2011). For the novice learner, this frees up cognitive resources by reducing extraneous load.

Spaced learning is another approach thought to reduce cognitive load and involves distributing learning and retrieval opportunities over a span of time (EEF, 2021). This is based on the principle that when material is broken down in smaller parts, it is easier to learn (EEF, 2021). This is similar to breaking down the steps in worked examples but adds the element of time and increased engagement of LTM. Another strategy of interleaving involves revisiting concepts which are similar or slightly different over a period of time (EFF, 2021). Both spacing and interleaving can be used within a lesson, across lessons or content areas (Perry et al, 2021).

Freeing up cognitive resources may also be facilitated by teachers through scaffolding (Van Merriënboer et al, 2003) and there is 'consistent evidence that well targeted scaffolds, guidance, and schema-based support are an effective approach to support students,' (Perry et al, 2021:27). Scaffolding is associated with Vygotsky, specifically with the zone of proximal development (Van de Pol et al, 2010; Davis & Mikaye, 2004) which, simply stated, is what the learner currently cannot not do without assistance (Vygotsky, 1978). Though there is no consensus regarding a definition of scaffolding, the basic metaphor is to provide support during construction, of a building or a skill/concept, and removing that support when no longer required (Van de Pol et al, 2010). The three characteristics of scaffolding are (1) contingency, meaning responsive or calibrated support, (2) fading, the removal of supports, and the shifting of (3) responsibility from the teacher to the student (Van de Pol et al, 2010. From a CLT perspective, it means reducing the cognitive load while students are novice learners for a topic or skill to allow more cognitive recourses to be available for learning. The instructional designs noted previously, such as the transient effect, split-attention and worked samples can be used to scaffold students time management skills. Additionally, practices such as modeling, feedback, and questioning can also be utilized by teachers in real-time when working with students (Van de Pol et al, 2010). Scaffolding is complex and individual to a student's needs with no one technique being successful in every situation, as well as the added complexity of teachers providing individual scaffolding in a classroom full of students (Davis & Miyake, 2004: Van de Pol et al, 2010). Teachers may set up frameworks, such as established routines, cues, or creating

subtasks to break down large assignments (Shonkoff et al, 2011). It is important for teachers to know when to scaffold and when to fade scaffolding and shift responsibility. For young children, social play is seen as a way of children testing for themselves the skills that have been scaffolded by adults (Shonkoff et al, 2011). For older students, this may take the form of completing tasks without teacher interventions. The fading and shifting responsibility concepts are important in order for students to achieve independence (Myhill & Warren, 2005) once the needed schemas are created in LTM. It is encouraging to note that there are, 'multiple agents provide scaffolding in the classroom including the teacher, other students, paper-based artifacts, classroom decorations, technology, and far more' (Davis & Miyake, 2004:267) for teachers to draw upon. Also available are talk-based activities where teachers and/or other students can scaffold learning which has its basis in Vygotsky's belief that language is fundamental to learning (Mercer et al, 2003). When addressing time management, teachers can use the strategies mentioned, as well as tools in their classrooms such as clocks.

The use of clocks as tools is of interest can be explored in terms of CLT, time monitoring and management. Before examining clocks, a look at graphic organizers show that they are a form of schema. A graphic organizer, simply stated, are lines and shapes when configured represent a visual representation of a pattern of thinking (Garnett, 2020). The brain perceives the graphic organizer as a whole and seeks to find patterns and associations by the positioning of the lines and shapes. Applying this to clocks, the face representation on a clock could be considered a dynamic graphic organizer for time management. A better understanding of how clocks are used to support time managements skills, may lead to strategies for using them more effectively in the classroom.

One critique of CLT is that the term 'executive load' is not explicit enough to allow insights into which practices, such as improved instructional materials, will or will not reduce load (Dixon, 1991). This implies that there is an amount of trial and error as to how to change instructional materials. Paas et al criticizes that, '...cognitive load theory (CLT) has focused on the alignment of instruction with cognitive process, without recognizing the role of motivation' (Paas et al., 2005:25). The role of motivation may be very pertinent to time management in middle school students.

Another critical perspective comes from looking at CLT through the lens of Popper (Chapter 1.1). Using his traditional critical rationalism, CLT is not a scientific theory because the fundamental assumptions cannot be empirically tested (Gerjets et al., 2009). These assumptions are: Extraneous cognitive load is caused by poor instructional design, cognitive processes result in extraneous cognitive load and this type of load is harmful for learning (Gerjets et al., 2009). The established

methods for measuring different cognitive loads are not sensitive enough in that they only provide an overall measurement. Popper holds a strict interpretation of theory. 'If one would follow a strict Popperian view – hardly any theory could be rendered scientific, not just in psychology, but also in 'hard' sciences like physics' (Gerjets et al., 2009:47). Nevertheless, CLT is a useful and practical framework for teachers to evaluate their classroom practices in order to try different designs of instructional materials to facilitate student learning. Whether the changes were to decrease extraneous load or improvement in another area, a net result of increased student learning is the overall goal.

Applying CLT to EF skills is not widely found in current literature. Uus et al (2020), however, has investigated the EF skills of planning and monitoring skills in the context of CLT with 111 middle school students (mean age 15 years). This study looked at self-directed learning (SDL), which involves student-initiated planning and monitoring skills. Students were asked to participate in a computer based educational program on the naming and taxonomy of dinosaurs. The project parameters looked at different trajectories of confidence depending on students' cognitive capacity, WM capacity enabling faster memorizing as evidence by less hesitation and if there was a preference for certain learning-exemplars. The experiment took place in a classroom to simulate students' everyday school environment. The conclusion was that students with higher WM capacity were able to memorize items faster and avoid distractions (Uus et al., 2020). This explores the ability to put information to use, not just WM capacity. Finally, this study concluded that since not all learners perform at the same level, some students need help to acquire their metacognitive skills (Uus et al., 2020).

CHAPTER 2.12- RESEARCH GAP

'Time management is a skill that every student should not only know, but also apply,'
(Nasrullah & Khan, 2015:67).

Current thinking about time management developed from a background of an intuitive understanding that there is a passage of time, to structuring time within a cultural framework and developing tools, clocks and other timepieces, for its practical use. Time management is a social skill needed by students in the classroom, as well as for their future adult success. Cognitive executive functioning skills are required to perform time management and a pivotal time when time management skills emerge is in early to early-adolescence, ages 11-14 years. These middle school years represent a time of rapid cognitive growth and increased expectations that students can manage their time independently. Teachers' understanding and pedagogy represent an opportunity to support the development of time management skills in the classroom. Using cognitive load theory as a framework for discussing instructional practices, teachers' and students' perceptions about the importance of time management, student proficiency, expectations and the use of clocks as time management tools is explored. This combination of perspectives applied to time management has not been found in current literature and seeks to add to our understanding of students in middle school classrooms with the aim of identifying instructional practices and further areas of research.

CHAPTER 3 – METHODS

In addressing the defined research gap, a research approach was developed considering the positionality of the researcher and method used to address the research questions. In addressing methodology, the topics of positionality, methods, sampling, ethical considerations, approach to analysis including validity and reliability are discussed.

CHAPTER 3.1 - POSITIONALITY

'Positionality profoundly influence, often in subtle ways, how individuals view and interact with the world; science education researchers are not exceptions' (Parsons, 2019:1286).

Decades of working as a scientist and middle school science educator have influenced my perceptions, approaches, and interpretations within education research. It is important to reflect on positionality to acknowledge and better understand that what we see can be influenced by what we are looking for based on context, framework, and prior knowledge (Hickman, 2011; Gibbs, 2007; Mason, 2002). Varaki et al ~~s~~tate (2015) that researchers are 'biased' by their background knowledge, culture, and worldview. Understanding personal worldviews or biases is important in approaching any research methodology, particularly interviews where two individuals are interacting. This research utilizes an interview methodology, which inherently includes interpreting experiences, interactions and responses of the participants and researcher.

When describing an ontological position regarding the nature of reality, a simplified view of positivism (objectivity) versus interpretivism (subjectivity) is often presented. The problem with applying these 'isms' to describe what a researcher does is that the dichotomy (positivism/interpretivism) excludes many research approaches (Swann & Pratt, 2003). I lean towards post-positivism which is more of an 'orientation' than a unified school of thought (Phillips & Burbules, 2000) and is a nonfoundationalist approach rejecting the view that knowledge is an absolute (Phillips & Burbules, 2000). This is not incompatible with an ~~i~~nterpretivist oriented research approach. One can describe interpretivism as focusing on examining insights into people's beliefs and personal experiences and views the social world as nuanced, multi-layered and complex (Denscombe, 2017). These personal experiences include teaching and learning which involve beliefs, goals, intentions, and values that require a social context for meaning (Swann & Pratt, 2003). My personal position is as a post-positivist employing the framework of natural science using qualitative

and/or quantitative data, as appropriate. The concern for this research is students' time management experiences in the classroom based on teachers' and students' perceptions. Though perceptions tend toward the interpretivist end of the ontological spectrum, they are compatible with a post-positivist orientation.

The individual perceptions of teachers and students regarding time management skills, including expectations of student competency and teacher pedagogy, will be explored. Regarding pedagogy, I do not believe there is a 'right way for all' method of teaching. Post-positivists do not seek to describe 'total reality' but relative true statements describing causal relationships (Phillips & Burbules, 2000:38). By looking at similarities and differences in the perceptions of teachers and students, these relative true statements, or recurring perceptions, may lead to suggested classroom pedagogy. Consistent with a post-positivist position, pedagogy can be developed which can be effective for most students with the acknowledgement that it will not be so for all students.

When describing an epistemological position regarding the nature of knowledge, another simplified spectrum emerges contrasting empiricism and rationalism (Swann & Pratt, 1999). Empiricism purports that knowledge comes from experience (Cohen et al., 2018; Thomas, 2017). This is contrasted with rationalism with knowledge coming from reasoning, both inductive and deductive (Thomas, 2017). Locke (1948) articulated how both experience and reasoning work together in that knowledge is based first in terms of experiences. These 'experiences' in a research context may be observations or measurements. Then, the mind can combine and manipulate ideas (Phillips & Burbules, 2000). In modern thinking, these 'isms' have been interpreted in a way that an epistemology may be both empiricist and rationalist (Swann & Pratt, 1999). There is a recognition that both reasoning and experience are important, but neither is the sole basis for knowledge creation. This contemporary view of epistemology is nonfoundationalist (Phillips & Burbules, 2000). Popper is a noted post-positivist and his evolutionary epistemology describes the idea that knowledge growth is similar to biological evolution (Norwich, 2020). In biological evolution by natural selection, traits are selected by their fitness to their environment. Traits which are most fit give an organism a higher probability of surviving and reproducing (Darwin, 1859). This is similar to a tentative theory (or hypothesis) that is created to address a problem or question. The theory is then subjected to rigourous evaluation in attempts to empirically disprove, like environmental pressures on a trait. Ideas which remain represent new knowledge (Norwich, 2020). This description aptly describes my view of research. With decades of teaching scientific methods, I have often used the scientific method diagram shown in Figure 1. This depiction of the scientific method represents my view of research. It should be noted that there are many versions of the scientific method with variations regarding when observation and background information is gathered. Figure

1 shows a flowchart of the scientific method in which the background information is gathered prior to hypothesis creation. This thesis is envisioned as asking the question, 'What are the perceptions of middle school students' time management skills in the classroom?' This project represents the next step of doing background research. This background research takes the form of a literature review and an exploratory interview methodology with teachers of and students ages 11-14 years, representing the middle school years. It is anticipated that the subsequent step of constructing a hypothesis could be done based on the findings of this project, as well as identifying areas of further research. This is in line with Popper's view of creating a hypothesis and attempting to disprove it, with this project seeking information to create an informed hypothesis. It is also important to note that 'good science is a product of communities or large-scale research programs, not of individual studies' (Stemhagen & Warnick, 2010:125). This small-scale project represents the first step that can then be built on by adding scale and depth.

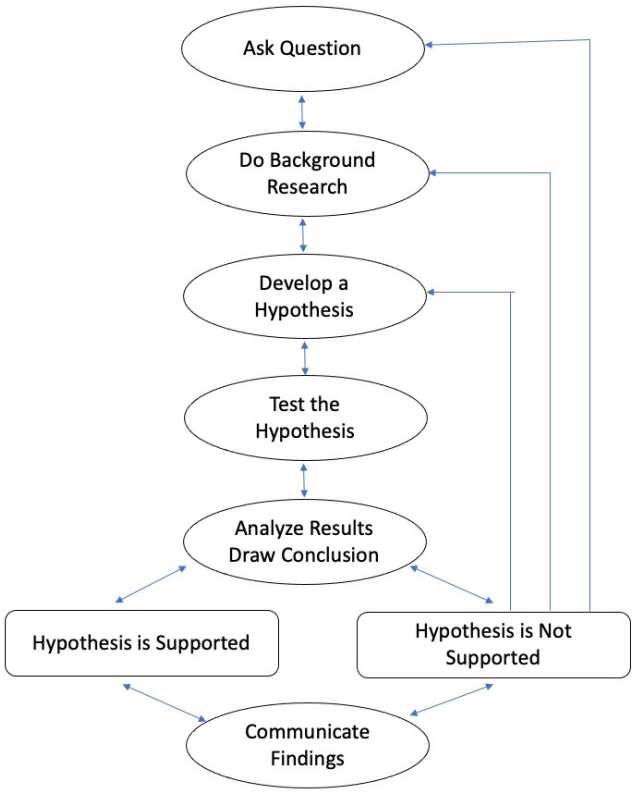

FIGURE 1 SCIENTIFIC METHOD DIAGRAM

For both ontology and epistemology, the term 'nonfoundational' best describes my research approach as not philosophy driven, but problem driven. It is the pragmatic perspective of a classroom teacher supporting students. Teachers may articulate the problem as, 'Many of my students are struggling academically and rarely get their work turned in on time or are rushed.' Pragmatism reflects a philosophical shift from abstract concerns to an emphasis on human practices and experiences (Norwich, 2020). Pragmatism is 'practice-driven' and practical (Denscombe, 2017; Cohen et al., 2018). Pragmatism supports using qualitative and/or quantitative data as relevant to the research question along with methodology this is 'fit for purpose' (Cresswell & Plano, 2011). Deweyan pragmatism is an example where social research retains elements of the scientific method and understands the need to anticipate and incorporate epistemological concerns (Cochran, 2002). Dewey also believed that through evolutionary biology that people actively engage, adjust and respond to their environment and learn from those activities (Thorburn, 2021). The framework of the scientific method resonates with my science background and concept of research. Popper had strong affinities with pragmatism as part of the process of evolutionary epistemology (Norwich, 2020) which also uses the scientific method as a methodological framework.

Popper's epistemology describes science as initiating when observations disagree with expectations (Swann, 2003). This research is exploring the similarities and, perhaps more telling, the differences between teachers' and students' perceptions of student time management in the educational setting of the classroom. With Popper's similar positionality based on scientific principles with post-positivist and pragmatic leanings, application of his position to education research is relevant. Swann (2003) discusses how Popper's approach to science can be applied to educational research including learning, teaching and schools, with the goal of improving educational practice. Exploring Popper's ideas for educational practice, Swann (2003) examines five epistemological ideas: All learning is a matter of problem solving (trial and error), reality can be represented in descriptive and argumentative language, true statements are supported by facts, 'certain or secure knowledge is a chimera' (Swann, 2003:254) and the differences between the physical, subjective and objective worlds. In summary, Popper's view that 'certain or secure knowledge is a chimera' or impossible to achieve, illustrates his post-positivist position, but does not imply that valuable knowledge cannot be obtained. Knowledge is created when observations do not fit expectations, and this disconnect needs to be resolved. Applying this to education, when teaching is not resulting in the expected student learning or where perceived student behaviour does not match teacher expectations, opportunities exist to make improvements to pedagogy. Returning to solving problems, education in terms of teaching and learning are practical activities and need practical solutions (Swann, 2003). Looking at this pragmatically, teachers need stated

guidance that can be tried in their classroom with the understanding that one 'solution' will not work for all students.

In addition to ontological and epistemological positions, it is also useful to examine assumptions about the role of education in society (Monroe et al., 2019). In my experience, examining personal views of the role of education is less frequently discussed as part of positionality. However, it influences topics and approaches to research (Monroe et al., 2019). In this regard, though my teaching experience is grounded in the natural sciences, I feel my obligation as an educator is to support overall student growth toward their adult life. In this view, exploring time management skills which cross curriculum boundaries and years in school is valuable. The broad applicability of these skills was instrumental in the selection of this research topic.

Personal teaching experiences also shape my positionality. From my experience, the pragmatist-based pedagogy emphasizing both greater teacher autonomy and students' ownership of their own learning (Thorburn, 2021) is effective. Consequently, when exploring student time management skills within the classroom, both the teachers' and the students' perceptions are equally important. Also from experience is the importance of teacher-student collaboration. Schön's (1983) reflection-in-action, or reflection-in-practice refers to real-time thinking and action where there is a 'spontaneous interplay between thinking and doing, in which ideas are formulated, tested and revised' (Rolfe, 2014:1080). These 'ideas' should be based on theory and educational practice (Rolfe, 2014). Studies have shown how communication between teacher and students supports students' cognitive process, specifically academically productive talk (Chen et al, 2020).

The positionality of the researcher is important, but so are the positions of the participants. Within the interview process, it is important that reflexivity extends to the participants in considering them 'experts' on the research question and valuing them within the research process (Scheier, 2012). In this research, it is their responses which constitute the data to be analyzed to address the research aims.

This research has been directed, but not limited to, the following guiding questions:

- What are teachers' perceptions of students' time management skills and strategies?
- What are students' perceptions of their own time management skills and strategies?
- What time tools are perceived to be helpful in supporting students (ages 11-14 years old) time management skills?

Using semi-structured interviews, responses from participants have broadened the initial scope of these questions to include perceptions of time management's connection to academic success,

classroom time management expectations, and where students are learning time management skills.

CHAPTER 3.2 - SEMI-STRUCTURED INTERVIEWS

Building on information gathered from the pilot study's web-based questionnaires (Appendix 2), semi-structured interviews were utilized for this study. Similar Likert questions from the pilot study were used with minor modifications for clarity and audience. For example, 'How often do you have students asking you what time it is?' a teacher's prompt was changed to 'How often do you perceive you ask your teacher what time it is?' for the student prompt. These were included so interview participant responses could be compared to the larger sample size of the pilot study. Though this comparison is not analyzed statistically, general agreement between the two studies is discussed. Additional prompts were developed based on responses to the one open-ended question in the pilot study, 'Briefly relate an experience you have observed of a student having time management difficulties in your class. How did the understanding of the passage of time and/or use of a clock contribute positively or negatively?' This question generated generalities and was the most skipped question with a nonresponse rate of 26% (Seymour, 2020). The nonresponse rate and general responses supported the need for semi-structured interviews to allow for follow-up questions, as opposed to a second questionnaire. The general comments did inform several prompts for the semi-structured interviews on topics such as use of timers, learning about time and classroom time management expectations. Additionally, based on the number of teachers who had no preference of clock type to use with students or who preferred digital clocks, combined with evidence from the media that there are students in the U.S. who can no longer read an analogue clock (Molina, 2018), the following prompt was added, 'Do you think analogue clock reading should be retained in the elementary school curriculum?'

Semi-structured interviews are a widely used and described research method (Cohen et al., 2018; Denscombe, 2017; Punch, 2000; Thomas, 2017). Interviews involve collecting data through direct verbal exchanges between individuals and differ from questionnaires in that the respondents are not required to record their responses to a fixed set of questions (Cohen et al., 2018). Exploratory interviews are heuristic in nature to develop hypotheses (Cohen et al., 2018). Due to the exploratory nature of this research, the flexibility of semi-structured interviews allowed for prompts to be used, but retaining the opportunity to use open-ended questions, add questions to explore a

comment made by the participant and tailor the wording as needed for individual participants (Cohen et al., 2018).

This study explores teachers' and students' perceptions. Researching perceptions is an established method in education (Bolliger & Martin, 2018; Faulk & King, 2013; Herro & Quigley, 2017; Wilson, 2014). It is further supported by Hargreaves (2013) and Aftab (2015) stating how important it was for their research to use and accurately reflect teachers' perceptions. As a former classroom teacher, I appreciate the insights gained by interactions with students and how perceptions are an important first step for this research. This project adds the perceptions of students regarding their own time management. It has been noted that some children offer 'surprisingly clear assessments' of their own EF strengths and weaknesses and insights to why they are having difficulties in school (Kaufman, 2010:127).

There are several assumptions embedded in the research questions and semi-structured interviews method. This research assumes that time management can be taught. The definition of time management used in this study includes EF skills which literature supports can be taught. Though no reference of managing time being biological secondary knowledge was found, being able to tell time on a clock does fit the definition of knowledge that is taught, therefore biologically secondary. The perception of time, however, may have both biological primary and secondary elements opening the question of how much teachers can influence this skill. Clocks as an effective time management tool is an assumption supported by the frequency of clocks being used in research and in guides for parents and teachers on how to support student EF skills (Braaten & Willoughby, 2014; Cooper-Kahn & Dietzel, 2008; Dawson & Guare, 2018; Kaufman, 2010). For clocks, there is an additional assumption of a difference between analogue and digital clocks when used in managing time. No research that points to this directly, however, there is a body of research noted in Chapter 2.1 examining differences in cognition between clock types. Regarding using semi-structured interviews, this assumes that teachers' perceptions of their students' time management are accurate, and that participants can accurately relate their ideas and metacognition.

The interviews took place over Microsoft Teams from 10 May through 12 August 2021. Ten teacher interviews were initiated, and all completed. The average teacher interview was 41.5 minutes with a range of 31-58 minutes. Ten student interviews were also conducted. The average duration of student interviews was 36.7 minutes, ranging from 28-56 minutes. In total, thirteen hours of interviews were used to inform the data analysis.

CHAPTER 3.2 - DEFINING THE RESEARCH SAMPLE

An exploratory, non-probability, purposive sampling strategy was used in this study. Sampling refers to the subset within a target population who will be involved as participants (Callegaro et al., 2015) with the goal being a group that is comparative and representative of the whole population (Gilliam, 2007). In this case, students and teachers with experience in U.S. middle school classrooms.

Due to the research gap identified in the literature review, an exploratory sampling type was utilized. This type is often used for unexplored topics focused on qualitative data and small-scale research (Denscombe, 2017). The initial literature review has identified time management in the classroom, specifically in students ages 11-14 years, as a research gap where exploratory sampling is appropriate. Non-probability sampling is used in exploratory sampling and includes the researcher's discretion or choice in the selection process of participants (Denscombe, 2017). The samples are identified by respondents' availability and/or the researcher, making the probability of selection unknowable (Ritter & Sue, 2007). Due to the exploratory nature and small-scale of this research, non-probability sampling was necessary.

A purposive sample, also known as a judgmental or expert sample, is a type of non-probability sample (Punch, 2016) and well suited for exploratory research (Denscombe, 2017). Denscombe (2017) states that by focusing on a relatively small number of respondents based on known relevance and knowledge, the best information can be gathered (Denscombe, 2017). Purposive sampling can be used to ensure a cross-section of respondents. In small scale research, random sampling may lead to one group being under/over-represented (Denscombe, 2017). Within the pilot study, science teachers in the southwest U.S. were an over-represented group (Seymour, 2020). A purposive sample was used for this thesis study. For teachers, the ten interviewees were spread over different subject areas taught and geographically across the U.S., as much as was practical with the availability of teachers. Student sampling were sought from multiple U.S. states. This in no measure represents the diversity across the U.S. However, it does increase the breadth of experiences and perceptions.

For the student group, ages 11-14 years was selected due to their having had time mathematics measurement curriculum in their early primary years and are now at an age when they are expected to work more independently and manage their own time. This is similar reasoning to Earnest's time study of fourth graders because, 'according to standards, time concepts including elapsed time have been mastered in prior grades, and their performance therefore illuminate any

persisting differencing in performance on problems involving time' (Earnest, 2015:286). The U.S. has been added to the sample frame to take advantage of comparing across only one country and the prevalence of available data from the pilot study web-based questionnaire which used snowball sampling. Even limiting the scope to within the U.S., it is acknowledged that there is a large diversity of teachers and students.

U.S. students and teachers were selected based on the pilot study's web-based questionnaire global response distribution of 89% of the responses coming from U.S. teachers (Seymour, 2020). By narrowing the focus to U.S. teachers and students, comparisons will be made with the U.S. pilot study responses. Another advantage of restricting participation to the U.S. is the commonalities found within the educational system including mathematics curriculum standards such as Common Core Curriculum Mathematics standards.

Parents were excluded due to the definition of time management used within this research, specifically the ability of students to get work completed in the classroom within the teacher specified length of time. The role of parents in terms of the home environment will be discussed in the interview analysis as a source of learning time management skills. However, time management at home was not within the scope of the research questions.

Recruitment of participants was primarily through contacts of personal contacts. In non-list based, non-probability samples, the recommendation is to use more than one recruitment channel spreading recruitment as broadly as practical (Callegaro et al., 2015). Participants were recruited through personal contacts including middle school teachers and non-teachers. An advantage of this approach was a positive response rate from initial contact through to interview. Only two teachers who expressed interest in participating did not follow through to having an interview. Only one parent/student did not make it the interview. Additionally, by interviewing contacts of close personal contacts, it removes the bias of interviewing someone the researcher knows well. A disadvantage is the small pool of potential interviewees. This is a smaller number than was reached during the pilot survey by FaceBook and listserv channels. One FaceBook post was made for potential interview participants to a university alumni group which yielded three teachers.

In non-probability sampling, a sample size may not be determined with 'the use of a calculator' (Ritter & Sue, 2007:23). The data analysis used QCA, looking at commonalities segmented by the research questions. With the exploratory nature of this research, sample size can be difficult to determine. Initially, five teachers and five students were sought for participation. However, additional interviews totaling ten teachers and ten students were conducted due to new

insights revealed in the interviews and facilitated by the positive response of potential participants. Table 4 and Table 5 show the profiles of the teachers and students interviewed.

Category	Teacher Distribution
U.S. States Represented	9 States (Arizona – 2 teachers) (California – 1 teacher) (Florida – 1 teacher) (Nevada – 1 teacher) (New Jersey – 2 teachers) (Ohio – 1 teacher) (Texas – 1 teacher) (Wisconsin – 1 teacher)
Academic Subject Area Taught	5 Academic Areas (Engineering – 1 teacher) (English – 2 teacher) (Mathematics – 3 teachers) (Science – 3 teachers) (Social Studies/History – 3 teachers)
Years of Teaching Experience	Range: 5-18 years Average: 12 years
Gender	Female: 7 Male: 3

TABLE 4 PARTICIPANT PROFILES: TEACHERS

Note: Some participants teach more than one subject area in an academic year.

Category	Student Distribution
U.S. States Represented	6 States (California – 3 students) (Connecticut – 1 student) (Maryland – 1 student) (North Carolina – 1 student) (Ohio – 4 students)
Age	Range: 11-14 years Average: 12.8 years
Gender	Female: 6 Male: 4

TABLE 5 PARTICIPANT PROFILES: STUDENTS

Within the sample, a variety of types of schools were included. Specifics about the schools was not inquired about in the interview. A general prompt was used of 'Would you describe your school?' Through those responses, general information was collected. Table 6 provides descriptions of interviewed participants' schools.

Participant Group	School Type	Grade Configuration of School	Student Class Sizes (Range)	Length of class periods in minutes (Range)
Teachers	Public (U.K. State): 6 Private (U.K. Public):2 Unknown: 2	6-7-8 grade middle school: 6 7-8 grade middle school: 1 K-8: 1 K-12: 1 Unknown: 1	17-37	43-90
Students	Public (U.K. State): 4 Private (U.K. Public): 3	6-7-8 grade middle schools: 6 K-8: 1	20-35	40-55

TABLE 6 DESCRIPTIONS OF SCHOOLS OF INTERVIEW PARTICIPANTS

Within the overall sample, the four students from Ohio were in the science class of the teacher in Ohio, as described in previously (Chapter 3). This provided an opportunity to explore a specific teacher's perceptions of the students' time management within the same classroom, in general terms. Due to confidentiality and ethics concerns, names were not shared, or specific students discussed.

CHAPTER 3.3 - ETHICAL CONSIDERATIONS

This project was undertaken with ethics approval from the University Research Ethics Committee using the University of Winchester Ethics Policy and British Education Research Association (BERA) Ethical Guidelines for Education Research as guidelines. The pilot study received Faculty Review approval (Form 3) on 9 July 2020 and the full research project received Committee approval on 11 April 2021 (RKEEC210301_Seymour1.19, Forms 1 and 4). Key issues for this project include interviewing a vulnerable group, confidentiality, and protection of information. The information sheets provided to teachers, parents, and students, along with the debrief form, can be found in Appendix 4.

Student participants ages 11-14 years are considered vulnerable due to their age and require additional ethical considerations. Parents were gatekeepers for this project and always contacted first. Only parent emails were used; no student emails were collected or used. Through the parent's email, both a parent and student participation information form were sent with a link to the online consent form. No interview was conducted without both consent forms. The consent form may be found in Appendix 5. Consent with participants was also confirmed verbally at the beginning of the recorded interview. The parents' email addresses were used for the Microsoft Team meetings and parents asked to set up the meeting. Parents were also invited by the researcher to listen in and be present. Either the parents or student could decide that a parent(s) should stay for the interview. Between speaking directly to a parent or seeing them in the background, it was evident that several parents were monitoring their child's interview. In other interviews, it was unknown. No parent or student specifically asked for a parent to sit in on the interview. The student participants were also reminded that they could skip any question or end the interview at any point without having to give a reason. Every effort was made to make the students feel comfortable and their responses valued. Several comments by students indicate that it was a positive experience. These include Students S3, 'It was fun. Thank you so much for interviewing me' and Student C1's mother saying, '...the questions were interesting to hear, and I would love to see it (final report) just for my information' and the student adding, 'Same'.

Adult teachers are not considered a vulnerable group, however, many of the same procedures were utilized. The teacher information sheet (Appendix 4) and consent form (Appendix 5) was sent via email. No interviews were conducted without a signed consent form. The interviews began with starting the recording and a brief review of the consent form including a reiteration that any question could be skipped, and the interview could be ended at any time without giving a reason.

Confidentiality and protection of data was maintained throughout the research project. Consent forms were administered and stored on the University's OneDrive under password protection. Also utilizing the University's systems, all interviews were conducted using Microsoft Teams and Streams. Interview recordings and transcripts were identified by the date and time of the interview without the use of names or other identifiers. Once transcribed, each interviewee was given a designator such as Teacher TA or Student S1. No video or voices will be used in any presentation of the data. Upon completion of the degree program, the raw data files will be deleted or in three years, whichever comes first.

CHAPTER 3.4 - SEMI-STRUCTURED INTERVIEW PROMPTS

Two sets of prompts were developed, one for teachers and another for student participants. These were designed to be similar to facilitate analysis of the two perspectives, teachers' and students', on the same topic. The prompts were also used to ensure that the consent form information was reviewed as part of the interview and to confirm eligibility. The prompts were arranged in four general topic areas: demographics, Likert questions, time management and time/clocks. Only students were asked to read clocks as part of the interview. The prompts were intended as conversation starters and follow up questions occurred naturally. The prompts provided a framework and flow of the interview while supporting exploring insights not included in the prompts. Teacher and student interview prompt forms are in Appendix 6. Table 7 is a representative sample of parallel interview prompts (teacher and student).

Teacher Prompts	Student Prompts
How would you describe your students' time management skills, in general?	How do you think you do at managing your time in class?
For those students who struggle with time management, what do you perceive is the major reason(s)?	If you are having a hard time getting your work done on time, what do you think is the major reason why? Or is there more than one reason?
What types of strategies do you perceive your students are using when completing tasks in class?	What types of strategies do you use when getting assignments done in class? Strategies meaning what do you do or think about to help you get things done?
Do you have a preference between using analogue clocks with students? If so, why and how do you use them?	Which type of clock do you like better? Why? (Asked after the analogue/digital clock reading questions.)
Do you remember a time when you couldn't tell time?	Do you remember a time when you couldn't tell time? Do you remember learning about clocks and time?

TABLE 7 EXAMPLES OF TEACHER AND STUDENT INTERVIEW PROMPTS

For students, when exploring time management strategies, two different content area scenarios were presented. Students were asked to describe what they would do in these scenarios. They were prompted to think about what strategies they would use or what they would do to organize their time. The first scenario was for a science assignment and was similarly presented.

> So, let's say I'm your teacher and I say, "OK, we're going to do a lab today. You're going to be taking the temperature of these different unknown liquids that I'm giving to you. Okay? So, you need to read the lab, do a data table, do the lab and do a graph. You've got 40 minutes" and then I stop talking. I don't give you any more information. So, how do you kind of start? What do you think you would do? (Interviewer from Student S1 transcript).

The wording varied slightly between interviews, but the steps remained the same. The amount of time varied to match what students indicated was their typical class period. The word 'strategy' was used with students but also phrases such as, '...walk me through your thought process and what you would do' (Student S3 transcript) or 'Could you describe to me what you would do as a student?' (Student S4 transcript).

The second scenario was for an English class, often referred to English-Language Arts (ELA) in the U.S. The scenario was similar to the excerpt from Student C2's transcript.

> We know we're not in science all day, so my second example is, let's say you're in English class or ELA class and you have to write a 5-paragraph essay on what it's been like to be a student during Covid. That's the subject...Could you describe to me, kind of, how you would approach it? What strategies you would use to, kind of, get it done on time? (Interviewer from Student C2 transcript).

The aim of using two different scenarios was two-fold. First, to rephrase the more general questions of 'What types of strategies do you use when getting assignments done in class?' (Table 7 above). Second, to explore whether students use different strategies for different subject areas.

Students were also presented with several analogue and digital clock faces (Appendix 7) and asked to read the time and determine the time thirty minutes later. The interviewer prefaced these questions by saying similar statements to, 'What I'm going to ask after that is could you explain to me what's going on in your head? Could you explain to me how you thought through this telling the time' (Interviewer from Student C3 transcript). This methodology is similar to that used by Boulton-Lewis (1997) with elementary students identifying the time on analogue and digital clocks. The addition of having students add thirty minutes to the original clock time and again explain their metacognition is included in thesis research.

CHAPTER 3.5 - ANALYSIS

In this exploratory research, teacher and student interviews will be analyzed looking for complementary and contrasting perceptions of student time management. A qualitative content analysis (QCA) approach is a method of systematically describing the meaning of the qualitative data (Schreier, 2012). This type of analysis allows for a degree of interpretation of the data and can be applied to interview transcripts (Schreier, 2012). This will be used concentrating on words and phrases with a measurement of their frequency (Denscombe, 2017) and allows for quantifying elements of the text. However, a limitation is the potential to dislocate the units and their meaning from their context (Denscombe, 2017).

Coding, in general, is a method of identifying patterns (Boyatzis,1998; Mills & Birks, 2014; Denscombe, 2017). Within the analysis, a data-driven, or inductive, approach was used with QCA. A focus on select aspects of the data differentiates QCA from other qualitative methods of analysis. This focus has the feature of not coding the full text, which is 'so rich that it is impossible for all practical purposes to really capture their full meaning' (Schreier, 2012:4). QCA reduces data and is flexible and systematic (Schreier, 2012). Considering the broad scope of the interview prompts, using a systematic way to focus coding on the specific research questions proved to be a pragmatic and effective approach. In QCA, it is the research questions that become the coding frame (Schreier, 2012). By using categories within a coding frame, it makes it possible to compare what participants are saying about the same topic, taking into consideration both the uniqueness of the individual response and the comparability of the question prompt (Schreier, 2012). The first step is to segment the material according to a thematic criterion before coding (Schreier, 2012). It is this segmentation that divides up the entire transcript into smaller units that fit within the coding frame (Schreier, 2012), in this case the research questions and a few additional prompts included in the overall research aims.

For coding the transcripts, segmentation was done using the teacher and student interview prompts. The prompts were grouped by topic and a general label for the topic became a segment. Once segments were defined, categories were created based on the prompts which contributed information to each segment. For example, the primary sources of data for the segment for teachers' perceptions of student time management skills, were the teacher prompts of, 'How often do you perceive students having problems using time effectively in class?' 'How would you describe your students' time management skills, in general?' and 'For those students who struggle with time management, what do you perceive is the major reason(s)? Would you give some examples of what you observe?' Coding was not limited to these questions because due to the fluidity of semi-

structured interviews, insights on specific segments and categories could happen throughout the interview. Once the categories were established, individual numeric codes were developed based on participant responses. These codes were hierarchical showing the segment, category, and code. As an example, using the segment mentioned earlier, S1 represents the segment of teacher's perceptions of student time management skills; S1C1 represents the first category in this segment, effectiveness of student time management; and S1C1.1 represents the first defined code of, 'In general, very good.' These codes were developed by reading the transcripts and assigning each idea a label or definition. On the transcript, dialogue was highlighted and assigned a code. The individual codes were added to as new insights were revealed in the transcripts. After the first review of the transcripts, codes were evaluated for redundancy and clarity. A second review of codes was accomplished by evaluating the excerpts highlighted in the coding process. Interview recordings were viewed twice; once to check the accuracy of the transcript wording and again to listen for emphasis not captured in the written account. The entire transcript was reviewed and there were no intentional omissions.

The category definitions are the rules used in coding to assign data to a category (Schreier, 2012). The segmentation and categories are listed in Table 8. The segments, categories along with the individual codes are found in Appendix 8.

Segment	Category
Teachers' perceptions of students' time management skills (proficiency)	Effectiveness of time management student skills Perceptions of struggles in time management skills
Teachers' perceptions of students' time management strategies	Time management skill expectations Successful student time management strategies
Students' perceptions of their own time management skills (proficiency)	Effectiveness of their time management Perceptions of struggles in time management skills.
Students' perceptions of their own time management strategies	Perceived time management expectations Successful strategies used by student

Time tools useful in time management	Analogue clocks
	Digital clocks
	Timers/Countdown timers
Preference between analogue and digital clock use	Prevalence of a preference
	Reasons analogue clocks preferred
	Reasons digital clock preferred
Analogue clock curriculum in primary grades	Opinion for continuation/discontinuation of standards
	Reasons for continuation/discontinuation of standards
Where do students learn their time management skills	School
	Family Home
	Extracurricular Activities
Examples of teaching time management in the classroom	Explicitly taught
	Implicitly taught
	Stated as 'Not taught'
Perception of time	Similar for both teachers and students
	Different for teachers and students
Experience learning about time	Memories of learning to tell time
	Does not remember
Metacognition of telling time (students only)	Analogue clocks
	Digital clocks

TABLE 8 CODING SEGMENTS AND CATEGORIES

Initially, a prior-research-driven approach was considered based on the results of the pilot study questionnaires. However, the limited breadth and specific wording of the pilot study questions did not yield enough data to generate codes prior to research. There were five key words/phrases which did occur in pilot study responses frequently to the open-ended questions mentioned earlier (Chapter 3.1) where teachers were asked to describe the time management struggles of a specific student. These were, in descending order of frequency, distracted, concept of time, use of a timer, difficulties with analogue clocks and visual representation of time. Developing a thematic code can be considered a continuum with theory-driven on one end and data-driven on the other (Boyatzis, 1998), it should be noted that these terms were not pre-selected as codes, but their existence may have influenced the coding.

CHAPTER 3.6 - VALIDITY AND RELIABILITY

Validity and reliability are important to consider during data gathering and analysis. Three areas of validity to consider are bias, power and strength of convergent validity. Removing as much bias as practical is a way to minimize its effect on data (Cohen et al., 2018). Bias can come from a variety of sources including, but not limited to, attitudes, opinions, and expectations of the interviewer, including seeking responses to support preconceived ideas and the tendency to see participants in their own image (Maxwell, 2005). A common source of bias is misinterpretation of participants' responses and their misinterpretation of questions being asked (Maxwell, 2005). This was mitigated by repeating or rewording questions when requested, and a final question asked to all participants of, 'Did you find any question in this survey that you felt uncertain about the wording or what was being asked? If so, which ones and let's go back to that question for clarification.' Out of the twenty interviews, only one (Student C3) had a clarification to a response which was a follow up question about switching classrooms. To further support the clarity of the questions, the wording of the questions in the pilot study was similar including asking if any questions were unclear. Out of 180 web-based questionnaires, thirteen (7%) responded yes to the question, 'Were there any questions in this survey that you felt it was unclear how to answer?' Those responses were used to refine the semi-structured interview prompts, including asking about the use of timers, the availability of clocks on students' personal devices (laptops, etc.) and teachers' reference to time when assigning a task (See Table 9). The additional detail was included to make the question more 'crystal clear' which helps reduce bias (Cohen et al., 2018:273).

Pilot Study Questionnaire	Semi-structured Interview Prompt
How often do you refer to time when you assign a task in class?	**Teacher Version:** How often do you refer to time when you assign a task and that could be referring to time like you have 20 minutes or referring to time like you need to be done with this by 2:30? **Student Version:** How often do you think your teacher refers to time in class? And it could be something like you have 20 minutes to do this assignment or you have to be done with this by 2:30. (Note: Taken from Teacher TF and Student S6 Transcripts)

TABLE 9 REVISION OF QUESTION BASED ON PARTICIPANT FEEDBACK

Bias occurs when a participant gives what they feel is a desirable response (Cohen et al., 2018). This could bias responses regarding the research topic. All participants were informed, in their respective participant information sheets and at the beginning of the interview, that student time management was the research topic. This may have biased participants to include time or time management more often in their responses than if they had unaware of the topic. Another reason participants may give perceived desirable responses is due to power positions. Bias and power position is linked and may have influenced this research where there are teacher-teacher (adult-adult) and teacher-student (adult-child) dynamics in the interviews. These differing power positions can affect the reliability and validity of the data. For the teacher interviews, the interviewer and interviewee were peers within the profession of middle school teaching. Some were acquaintances of the researcher, but never in a supervisor/teacher dynamic. Seven of the ten teachers were unknown to the researcher. Two of the three known teachers have never worked in the same school and one teacher had worked in the past in the same school, but in a different department. However, even with this apparent minimum influence, the following comment from the pilot study illustrates that a bias most likely exists.

> I also imagine there's huge bias in self-reporting like this because I felt pressure to answer that I often used time specifications in my directions - but I'm not sure. I did my best to keep it honest but that was a conversation I had with myself (LS1: Respondent #61).

Regarding minimizing bias and power imbalance with students, the following verbiage was used by the interviewer at the beginning of student interviews:

> I'm going to be asking you about what it's like to be a middle school student from your perspective. So, there's no right answer. There's no wrong answer. There's no answer I'm looking for. What I'm looking for is your perspective, what you think? How you think about it? (Student Transcript S6).

Interviews are mutual and a two-way interaction (Cohen et al., 2018). As an informal review of participant transcripts, the incidences of the phrase 'you know' were counted. This phrase implies a level of mutual understanding. On average, the teacher transcripts contained this phrase five times more often than student transcripts. This may be an artifact of individual speech habits. However, it may provide an indication of the peer relationships, based on being middle school teachers, between the researcher (interviewer) and teachers. Student use of 'you know' may also indicate a perception of common understanding of being in a middle school classroom.

Both teacher and students were given a $5 Amazon gift card after the interview as a 'thank you'. Participants did know about the card prior to the interview. Due to the small monetary amount, it is not felt that this would impose undue influence on responses.

Comparing the pilot study quantitative data with the comparable questions in the interviews give a measure of validity regarding how the smaller group of interviewed participants compares to the larger questionnaire group. Where applicable, such as Likert formatted questions, interview participants' responses are compared to the larger pool of pilot study responses. Convergent validity occurs when two or more measures agree with the measures coming from different sources (Cohen et al., 2018).

Reliability refers to the consistency of coding (Schreier, 2012). A first step in establishing reliability is to be explicit regarding the meaning given to categories and codes with labels that are concise and descriptive (Scheier, 2012). This helps prevent a category being used in different manners. When applying the codes, double coding is preferable, however, it can be done by one person (Schreier, 2012). This research was coded by a single person, the researcher, with coding applied twice. The first coding was completed using solely the transcript. On a separate day, a second coding was done on highlighted comments on the transcript. Additionally, the video recordings were reviewed a second time. There was no specific literature supporting this approach. However, it seems reasonable that reviewing the recorded interview alongside the transcript for the second coding event may lead to better understanding of the context. Context is important because

in the process of segmentation, the unit of coding is removed from its surrounding context and examined in comparative isolation (Schreier, 2012). In qualitative research, context is required to interpret meaning (Schreier, 2012).

Additional influences which pose difficulties with coding reliability are projection, sampling and mood or style. Projection imposing the researchers' emotion, values and attitudes can particularly be influential if the researcher has a strong ideology or theory (Boyatizis, 1998). For this data, no strong ideology or theory is presented. However, the lens of an experienced classroom teacher coding both teachers and students may have an influence. To minimize this, quotations from transcripts and context coding was emphasized. Sampling can also influence the analysis and it is noted that the small sample size does not represent all teachers or all students of this age group. Lastly, the researcher's general mood and style of coding can be an issue with the ability to apply the codes consistently key (Boyatzis, 1998). There are many known, unknown and unknowable aspects to social research (Milner, 2007). Discussed here have been known influences. There is an acknowledgement that some aspects and influences on data are unknown and unknowable.

CHAPTER 3.7 - ANALYSIS AND DISCUSSION ORGANIZATION

The analysis and discussion sections will follow the organization and structure in Figure 2. This organization is based on the segmentation analyzed using QCA.

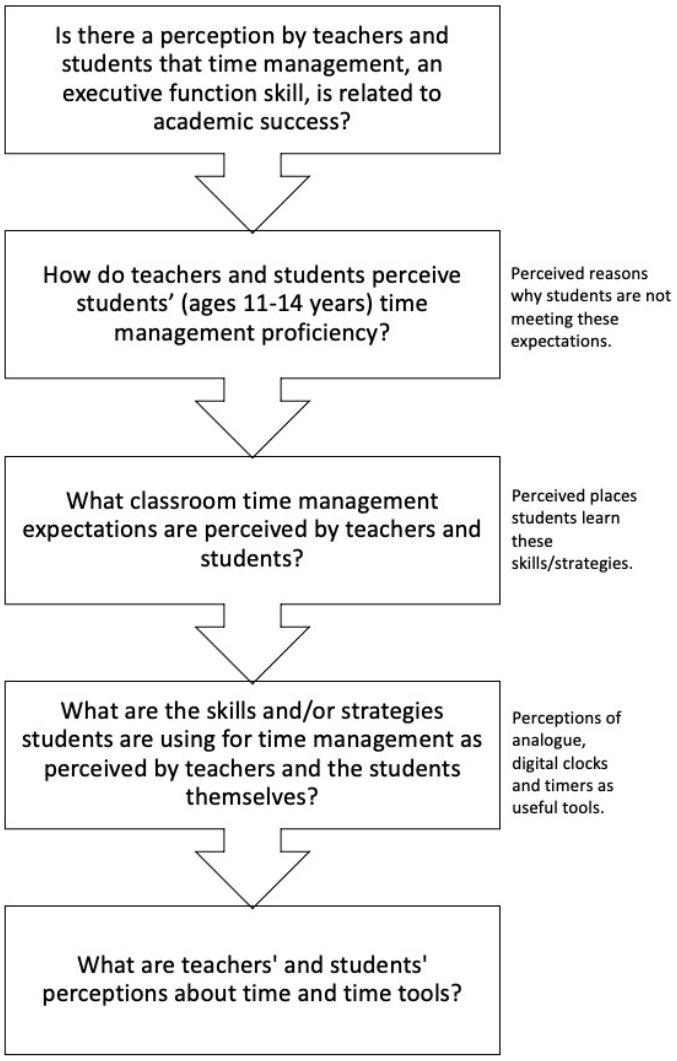

FIGURE 2 CONCEPTUAL ORGANIZATION BASED ON INTERVIEW PROMPTS

CHAPTER 4 – ANALYSIS

'The idea of analysis implies some kind of transformation' (Gibbs, 2007:1).

This analysis is based on twenty interviews exploring participants' (teachers' and students') perceptions of student time management. The interview prompts were informed by a pilot study utilizing a web-based questionnaire for teachers. Four Likert questions were included in the pilot study questionnaire, as well as teacher and student interviews to provide a means of comparison. This chapter begins with a comparison of these responses. Following, the majority of the analysis will be of the interviewed participants responses organized around five research questions, as shown in Figure 2 (Chapter 3.7).

CHAPTER 4.1 - COMPARISON OF DATA SETS

As stated above, a pilot study was completed with a web-based questionnaire to teachers regarding student time management. When developing the interview prompts for this study, four specific pilot study questions were included to provide a means of comparison between the three participant groups: Pilot Study (U.S only), teacher and student interview participants. This comparison was performed to gauge how closely the smaller set of interview responses to the Likert questions compared to the larger pilot study set, as well as how closely student responses compared to teachers. In the pilot study and interviews, teachers were asked to respond to four Likert questions. The questions were: Q1: How often do you have students asking you what time it is in class? Q2: How often do you refer to time when you assign a task in class? Q3: How often do you perceive students referring to a clock during an assignment including watches or cell phones? and Q4: How often do you perceive students having problems using time effectively in class? Similar questions were asked to students in this study. The questions were reworded to reflect the students' perspective, such as, 'How often do you ask what time it is in class?' The results are shown in Figures 3-6 (below) organized by question.

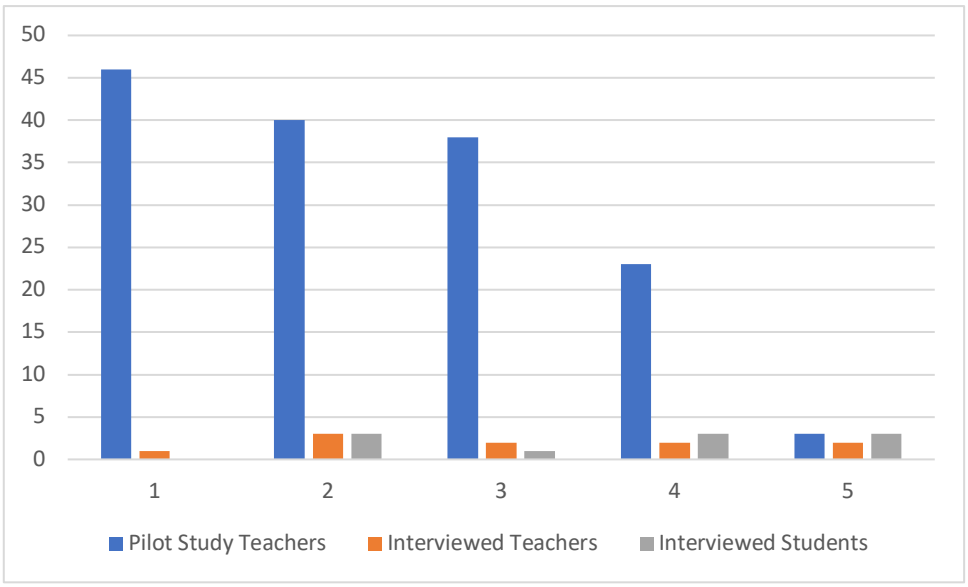

FIGURE 3 NUMBER OF PARTICIPANTS PER RESEARCH GROUP OF HOW OFTEN STUDENTS ARE PERCEIVED TO BE ASKING WHAT TIME IT IS IN CLASS (Q1)

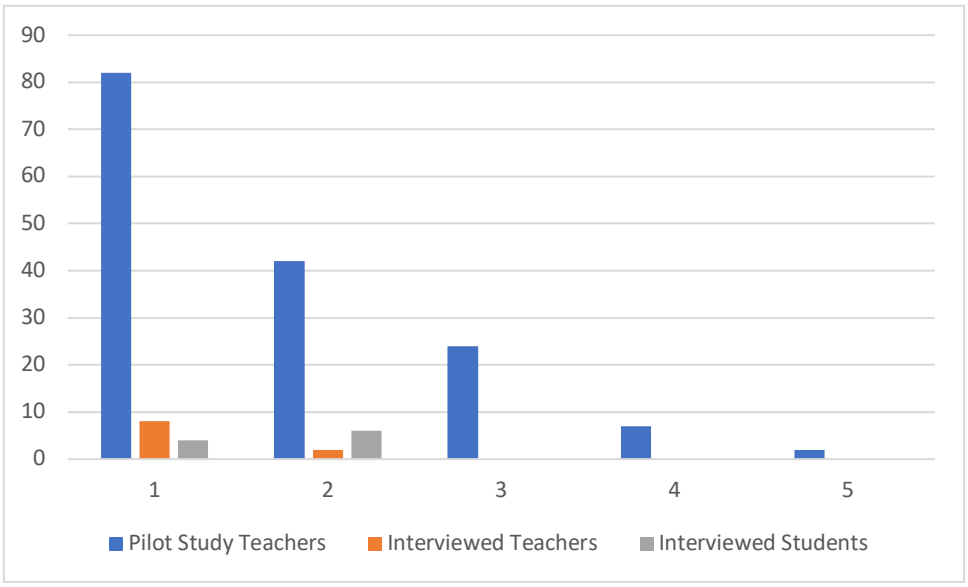

FIGURE 4 NUMBER OF PARTICIPANTS PER RESEARCH GROUP OF HOW OFTEN TEACHERS ARE PERCEIVED TO BE REFERRING TO TIME IN CLASS (Q2)

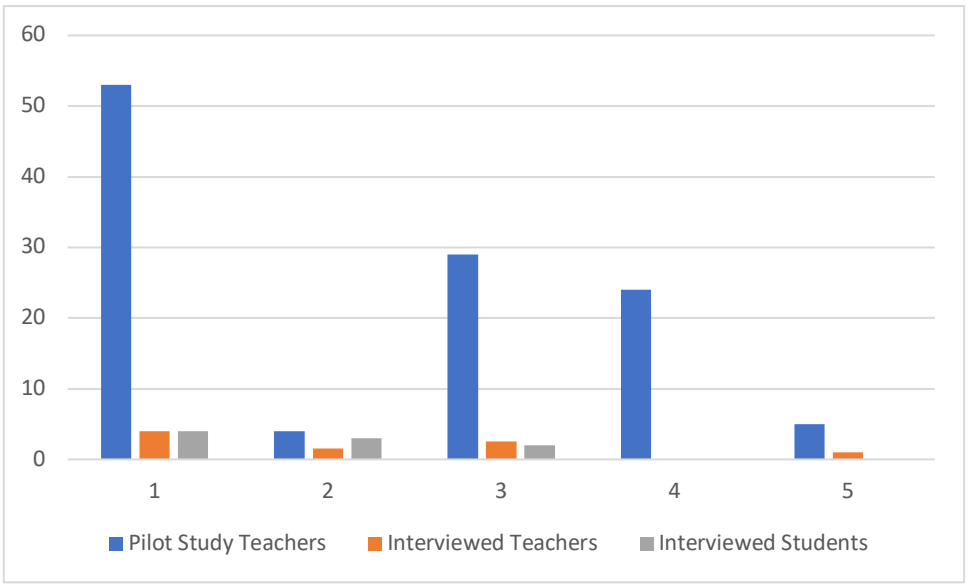

FIGURE 5 NUMBER OF PARTICIPANTS PER RESEARCH GROUP OF HOW OFTEN STUDENTS ARE PERCEIVED TO BE REFERRING TO TIME IN CLASS (Q3)

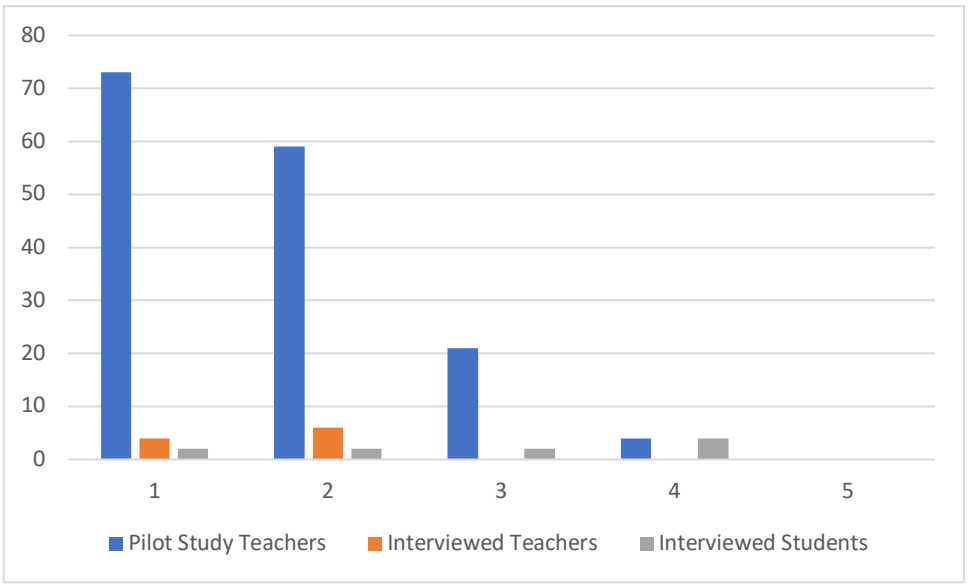

FIGURE 6 NUMBER OF PARTICIPANTS PER RESEARCH GROUP OF HOW OFTEN IT IS PERCEIVED THAT STUDENTS ARE STRUGGLING WITH THEIR TIME MANAGEMENT IN CLASS (Q4)

As a general comparison of mean Likert scores (Very Often = 5; Never = 10, U.S. pilot study teachers with the interviewed teachers and students, the responses are more similar for question Q2, teachers referring to time. The least similar is Q4, frequency of perceived student time management struggles. See Table 10. For Q4, comparing the teachers in the pilot study to the interviewed teachers, there is closer agreement with average scored response range of 4.1-4.5 (0.4 difference) agreement. This contrasts with the larger disparity between teachers (pilot study and interviewed) and students for this question with an average scored response range of 3.2-4.1 (0.9 difference). Overall, there is an indication that for these four questions, the interview participants hold similar views to the larger pilot study. Using this as a starting point, the interviews of both teachers and students are designed to provide a deeper understanding of students perceived time management and use of time tools.

Question	Average Numerical Response	Range of Averages (Differences)	Standard Deviation	Coefficient of Variation
Q1	2.9	2.4 - 3.5 (0.9)	0.45	0.15
Q2	4.7	4.2 - 4.8 (0.6)	0.25	0.08
Q3	3.8	3.4 - 4.2 (0.8)	0.33	0.11
Q4	4.1	3.2 - 4.5 (1.3)	0.54	0.30

TABLE 10 COMPARISON OF MEAN LIKERT SCORES BETWEEN RESEARCH GROUPS

CHAPTER 4.2 - INTERVIEW ANALYSIS ORGANIZED BY QUESTION

The guiding questions (Chapter 1, Table 1) were used to develop the semi-structured interview prompts. Due to the flexibility of semi-structured interviews, additional insights and topics were addressed. To organize this additional information, the interview analysis is organized into the five research questions shown earlier in (Chapter 3.7). Analysis of each question will include responses from both teachers and students.

<u>Research Question 1</u>: Is there a perception by teachers and students that time management is related to academic success?

This project looks at time management as defined by students using time efficiently to complete assignments within the teacher specified time. This definition includes multiple EF skills. As discussed earlier (Chapter 2.4), EF skills are associated with academic success. Time management is also considered important to academic success in teachers' perceptions within this study. Though not a teacher interview prompt originally, the question, 'Do you think time management and academic success are related?' occurred in all the teacher interviews. All ten teachers indicated that they felt that time management contributes to academic success. This is supported by literature which associates both EF skills and time management skills with academic success (Alyami et al, 2021; Nasrullah & Kahn, 2015; Samuels et al, 2016). Some teachers responded strongly such as, 'Absolutely' (Teachers TA and TC). Teacher TA went on to add, 'So, I think there is a direct link between academic success and time management skills.' Teacher TG responded 'Yes, of course, without question,' Teacher TI '...very strongly related', and Teacher TE, 'Yes, very much so. I think it's huge.' The remaining teachers responded 'yes'.

Teachers provided a variety of insights for the link between time management and academic success listed in Table 11. The comments address issues such as test taking strategies and work quality which contribute to academic success.

Teacher	Teacher Perceptions of Time Management Contributing to Academic Success
TA	'Students who know how to manage their time well obviously are going to do better 'cause they can use those test taking strategies to their ability...moving around to answer all the questions and make sure they get done as much as possible.'
TF	'I think students that do learn time management skills and they become proficient in it, have an easier time managing expectations of teachers because they can get task, task X, Y and Z done at a certain amount of time and then because they are more efficient with their time, if there's something that needs to be fixed in it or redone, they have that time to go back and redo those kinds of things.'
TI	'... I think kids being able to manage their time and organize, you know their work and their thoughts and what they're supposed to be doing. Those are the kids that I see being the most successful.'

CT	'I think that because students need to know how to complete things effectively. They can't, they can't...they're not very effective. If they take a bunch of time on a few things and then race through the end, then they have sloppy stuff. So, they need to learn to spread out their effort. And they need some judgment about what things are, what things should take more time.'

TABLE 11 TEACHER PERCEPTIONS OF TIME MANAGEMENT CONTRIBUTIONS TO ACADEMIC SUCCESS

Teacher TJ provided a different insight. Teacher TJ stated, 'Yes, but I do think that sometimes time management is more of a symptom than an actual skill itself.' Going on to say, 'I rarely have seen time management stand on its own'. These comments speak to the complexity of what is termed 'time management'. Time management involves EF skills which are not a single trait, but a set of cognitive abilities (McCloskey et al, 2009). Time management was specifically defined in this study as students using time efficiently to complete assignments within the teacher specified time. This is a pragmatic definition for this research relating time management to teachers and students within the classroom setting. However, what was not differentiated in this definition are the various skills which contribute to time management such as task initiation, task sub-dividing, priority setting, and impulse control. Teacher TJ commented on organization and prioritization, but also added, 'Generally would be, again either struggling or overwhelmed. One would be (pause) just I'm gonna call it lack of motivation.' Literature supports that motivation can be positively affected by strong EF skills (Rinaldi et al, 2021) and negatively affected by weak EF skills (EEF, 2021).

Only two of the ten students were specifically asked this question, and both responded 'yes' (C4 and S6) and both consider themselves good time managers. Student C4 did not expand on the initial 'yes' response that they were positively related. Student S6, however, added that, 'I think that if you're not focused or doing what you're supposed to be working on, then you like, you won't get the work actually done.' The perceived importance of time management was addressed when Student S3 responded to whether time management should be taught in the classroom.

> So, they haven't taught us like life skills like how to do time management or how to meet deadlines and taxes and other things like that that are central for knowing time management and things like that because it comes into a real play in real life and a lot of my class doesn't have the life skills to do it. And it's something very, very important. So, I do feel like they should teach it (time management) much more than they do (Student S3).

This student suggests that time management is not taught, but expected, implicit or tacit knowledge. Moving tacit knowledge into being explicit has been shown to be effective in research with writing skills (Silby & Watts, 2015).

<u>Research Question 2</u>: How do teachers and students perceive students' (ages 11-14 years) time management proficiency?

Following a perception that time management contributes to academic success, the perceived proficiency of students' skills by their teachers and themselves explores whether this is an area where improvement in classroom practice may be recommended. Five of the ten teachers' (TA, TC, TD, TF, TG) first response to the question, 'How would you describe your student's time management, in general?' was 'not good'. One teacher (TJ) responded good. Two teachers (TA and TB) responded 'very good'. One of these teachers (TA) went on to say that there were distinctions between groups of students.

> So, if I were to compare the two, the high honors seventh grade group that I teach for algebra have a very good sense of time management, I think because they're kind of very, they have greater aptitude for that kind of thing. They have a more developed sense of maturity in that sense. Whereas for the pre-algebra students that I teach, they may not have that same sense of time management as the as the other students do (Teacher TA).

In fact, teachers (TE, TI, TJ, and CT) commented about different groups of students, rather than an overall, general statement. Teacher TJ described experience with students across the 11-14-year age span.

> I have seen a lot of students that have really good time management that are very skilled at, "OK, I'm telling you this is the exercise to do. You have five minutes." I might even give them ten or twenty minutes and the longer time frames. They will typically then assign a person to like double check the time, make sure the team is on track. And there will be students that are very good at kind of keeping an eye on the clock while they do their work, kind of get it done efficiently. And there are students that are just not in the same realm of time, period. They just, they have no concept of the time anything should take (Teacher TJ).

Variations in EF skills within the same age group is expected since these skills vary in the development within individuals and between individuals (Miyake & Friedman, 2012; Friedman et al, 2008; Mahy at al, 2014; McCloskey et al, 2009). Though the teachers referred to groups of students, each student would have their own EF strengths and weaknesses.

Teacher CT related a perceived growth in time management skills, 'I would say that the eighth graders are better at it (time management) than the sixth graders. Like, I can see that developmentally.'

This developmental growth of skills for this age group is supported by literature (McCloskey et al, 2009).

No teachers indicated that there were consistently very good or good student time management skills within their students. Students, however, rated themselves slightly stronger in their time management as seen in Table 12. Student C2 stated, 'I think it's okay. It depends on who I'm working with, probably.'

Time Management Proficiency Categories	Students' Self-Assessment
Very Good	C1
Good	S2, S3, S6, C4
Depends	C2
Not Good	S1, S4, S5, C3

TABLE 12 STUDENT PERCEPTION OF THEIR OWN TIME MANAGEMENT PROFICIENCY

When comparing the Likert question Q4 related to how often struggles or difficulties in time management are perceived, there is also a trend that teachers, both pilot and thesis study, perceive students struggling with time management more than the students do, referring to Figure 6 (Chapter 4.1).

<u>Research Questions 3</u>: What classroom time management expectations are perceived by teachers and students?

Whether students' time management is perceived as 'good' relies on understanding what expectations are being used for evaluation. Additionally, there needs to be a shared understanding of expectations between teacher and student. The project data shows that there is disconnect between what teachers are expecting and students' interpretation of teacher expectations.

Both teachers and students were asked similarly worded questions with the intent of focusing responses specifically on expectations for students ages 11-14 years, or middle school years. Below is the question from a student transcript.

> OK, you're in middle school, which means you're not in elementary school anymore, and you're not quite in high school, so your teachers have certain expectations, things they expect you to be able to do in class for organization and time management. If you had to

> make a list of like three to five things that you go, 'My teachers expect me to do this without being told.' What do you think that list would have on it?' (Interviewer in Student S6 Transcript)

Coding for time management expectations came primarily from responses to this question, but also when participants referred to expectations in other parts of the interview. For example, Student S4 framed an expectation as 'Um, but that's just like an unwritten rule. No talking.'

Teachers' expectations were represented by twelve different codes with the top five for teacher interviews being:

1. Tracking time (TA, TC, TD, TF, TG, TI, TJ, CT)
2. Following the daily schedule (TD, TF, TI, TJ)
3. Subdividing tasks (TF, TG, TI)
4. Estimating time (TG, TJ, CT)
5. Planning time (TC, TF, TI)

Planning time is a broad term. Teacher TC provided an example of planning expectations.

> I certainly would have it that they (students) would understand how to how to plan their time, how to know what needs to get done, and to understand what the end product is supposed to be. So, at the end of 70 minutes, what should I have completed? And then be able to work, kind of backwards. Okay, in order to get that completed, then I need to do, Y and Z before that. So, that they could kind of plan. Again, understanding what the end goal is, which I don't think they always understand is what, what is my goal at the end of this class (Teacher TC).

Students' perceptions of what was expected of them as middle school students regarding time management skills in the classroom were included in eleven codes (see Appendix 8). However, only one code received more than three comments from the ten students. The three codes which had two or more student contributions are:

1. Complete tasks on time (S1, S2, S3, S5, S6, C1, C2, C3, C4)
2. Work as fast as possible (S4, S5, C2)
3. Focus/Self-regulation (S4, C1)

The majority of student comments reflect the goal of getting a task completed in the teacher assigned amount of time. For example, Student S6 related, '...do the assignment when you're told to.' And Student C1, 'So, they expect us to get our assignments on time.' Student C4 indicated that teachers, 'probably expect us to use our time wisely and get things done by the time she gives us.'

'Probably expect' implies that this is an unspoken expectation, tacit knowledge about the how the classroom works (Silby & Watts, 2015). One student gave the indication that teachers' expectations were not always realistic when saying, '...pretty much get everything done on time and be able to like work time management even in groups, which I often feel's just wishful thinking and luck' (Student S5).

The majority of participants were geographically dispersed. However, this research contains one teacher and four students in the same classroom which serves as a limited case study, as described in Chapter 3. This allowed a comparison between a specific teacher and students in the same classroom exploring their shared concept of time management expectations. Teacher CT indicated that completing tasks on time, tracking time and managing time are classroom expectations. This is compared to student responses. The notable similarity is that completing tasks on time is generally understood as an expectation. The expected and needed skills vary between participants. Table 13 shows the distribution of teacher and student responses regarding this specific classroom's time management expectations along with students' self-assessed time management skills.

Expectation	Teacher CT	Student C1 (Self-assessed Very Good)	Student C4 (Self-assessed: Good)	Student C2 (Self-assessed: Depends)	Student C3 (Self-assessed: Not Good)
Complete Tasks on Time	√	√	√		√
Tracking Time	√			√	
Managing Time	√				
Focus		√		√	
Planning Time				√	
Work done well/Neat		√			
Subdivide Tasks					√

TABLE 13 COMPARISON OF TEACHER AND STUDENT TIME MANAGEMENT EXPECTATIONS IN THE SAME CLASSROOM

Without clear expectations and an understanding of how to meet those expectations, some students may struggle (McIntosh, 2009). With teacher and student perceptions that not all students are good at time management, teacher and student interviews provide some insights as to perceived weaknesses. All ten of interviewed teachers indicated that students very often or often struggle with time management in their classrooms via the Likert scale questions (Q4). Similarly, 132 (81%) of pilot study teachers indicated the same. Through the interview question asking, 'For the students that you see struggle with time management, what do you perceive is the major reason why?' (Teacher TB transcript), teachers expressed major reasons based on their experience with students. The reasons fell within thirteen codes with four codes indicated by four or more teachers. These are:

1. Procrastination/Laziness (TB, TC, TE, TF, TJ)
2. Lack of self-regulation or Focus/Distracted/Socializing (TE, TF, TJ, CT)
3. Lack of a perception of time/Internal clock (TA, TC, TE, TJ)
4. Trouble reading a clock (TB, TE, TJ, CT)

Interview comments related to each of the above codes can be organized into two general groupings, motivation/focus and tracking time. The terms procrastination and laziness have been coded to indicate the student is making a decision not to engage in a task whereas lack of regulation, focus and distraction indicates that the student unintentionally does not engage or gets off task. There is overlap between these two terms as illustrated by a comment by Teacher TF that, '... there's a lot of procrastination, and a lot of, kind of, finding something else to keep themselves busy when they should be using the time to complete whatever task has been assigned.' Student S2 comment, 'Yeah, there are distractions that can cause you to procrastinate,' also shows the overlap between these terms.

Teacher descriptions of procrastination and/or laziness include Teacher TB, 'Part of it is procrastination. "I'm gonna, I'm gonna do it tonight." A lot of laziness.' Another example includes Teacher TE, '...it's really a lack of motivation or avoidance...they put it off, put it off, put it off until they are under so much pressure that they have to get it done.' Students also commented indicating a self-awareness of these behaviours. 'I've, um, procrastinated,' was Student S2's response when asked the main reasons for having trouble with time management. Student S5 commented on other students in class, saying, 'People don't want to do it and don't feel motivated, so they just kind of sit around and slack off.' Research indicates that students with weak EF skills compared to their peers are often perceived as lazy or lacking motivation (McCloskey at al, 2009).

Also fitting in the general category of motivation and focus are comments related to lack of self-regulation including distraction and socializing. Teacher TF related that students, 'typically will either talk to a friend or they'll do some other thing that's kind of a distraction, like maybe their phone or something like that.' Whereas Teacher CT was more general in saying, 'I think the biggest time management distraction they have is in their own heads.' Students most frequently commented on reason for struggling with time management was self-regulation or focus including distraction and socializing, as seen in this list of students' perceptions related to personal time management struggles.

1. Lack of self-regulation or Focus/Distracted/Socializing (S1, S2, S3, S5, S6, C1, C2, C3, C4)
2. Spending too long on one item/Working too slow (S3, S4, S6, C1, C4)
3. Don't understand what is needed or said (S1, S3, S4, S6)
4. Procrastination/Laziness (S1, S2, S5)

(Note: The student list contained ten codes with four codes represented by three or more students.)

Student comments include, '...I'm talking to my friends and stuff' (Student S6) and 'Well, I just get distracted easily and this get like lost in my own mind sometimes. Or I'm like whispering to a neighbor' (Student C3). This is expected as middle school is characterized by increased importance of peers and friends (Eccles et al, 1993). Student S3 used the word 'dawdle' and was asked by the interviewer to explain. 'I'm going to dawdle...'Dawdle' to me kind of means like to get off of topic or like be playing with something and not focusing on what you need to focus on.' Distractions were seen to come from a variety of sources as seen by comments by Student C2.

> ...who you're sitting next to or close to, because if I'm sitting close to somebody who distracts me, then it's harder to get work done...Another thing that is when teachers are, probably, when teachers like talking all the time...Probably because I'm really tired and I didn't hear what the teacher was saying and I don't want just to do. I was like super sleepy and I can't focus straight or that's probably the main reason (Student C2).

Student C3 gives a detailed insight into being distracted in class.

> But, my science class, I have someone who's a little talkative and we talk a lot. So, I'm gonna use that as an example. We would probably get a little distracted and start talking, and then I would like forget what I was doing for a little bit. And then, we would talk and then I would just be like, 'Okay, I need to work.' So, then I would start to work and you might talk again and then, like sometimes the teacher would be like, 'You have ten minutes left,' and be like, 'Oh gosh, I need to get that, go faster', which sometimes ends up leaving sloppy work also, so yeah.

Student C2 described being distracted while doing schoolwork at home. Time management at home is not in the scope of this research but provides an interesting insight.

> Student C2: I think at home I'm kind of more laid back and I give myself breaks in between because it's much easier for me to focus if I give myself breaks because like I get bored easily and then I get distracted and then if I get until distractions and do something else for it and then come back to it, I'm more, much more productive...I give myself like little breaks in between homework assignments. That's what I am doing.
>
> Interviewer: If I could describe that a different way, you're actually taking more control over your time management and giving yourself some breaks so that you can be more productive later. Is that correct?
>
> Student C2: Correct, yeah.

Along with motivation and focus, tracking time represents the second major grouping of codes. There is a contrast between teacher and student comments. Teachers' comments focused on the perception of time including internal clocks and difficulties in students' abilities to read clocks. For example, 'I think the greatest struggle is that they don't have the internal clock as developed as some of the other students' (Teacher TA) and 'They just, they have no concept of the time anything should take' (Teacher TJ). Only one student mentioned tracking time. 'So, students goof off and don't look at clocks all the time. They could be halfway through class and have gotten very little done' (Student C3). Difficulties regarding reading analogue clocks was commented on by four teachers regarding why students struggle with time management and an additional two (TA and TI) later in their interviews. These teachers related observations such as, 'But when I used to (do sign outs for the restroom) and they had to write the time when they were leaving the room, they had to think about it. It took effort to read the clock' (Teacher CT). Teacher TI noted that, 'I'm noticing it more every year. They don't know how to read those (analogue) clocks.' Teacher TJ commented, 'I think we talked about reading clocks and they all had a basic understanding that all learned it before, but they just weren't comfortable with it, because they hadn't regularly used analogue clocks.' Student comments support media's claim (Dean, 2018; Molina, 2018) that some people are not comfortable reading analogue clocks. Student S1 related, 'I remember the longer hand is always the hour. Wait. So, you're so used to looking at digital clocks, sometimes I forget how to tell time with analogue clocks.' Also, '...it's harder to read the analogue because you have to figure out which stick is which, and then where they are pointing' (Students S5). Student S3 gives more detail about why reading an analogue clock is harder.

> ...if I'm looking at an analogue clock on the wall or something like that, it usually takes me a minute of two to try to figure out what time it is. Because usually it's a little bit harder for my brain to process what's going on and try to pay attention, and it's easier just to see the numbers (referring to a digital clock) and know that's the time and not have to do any mental math (Student S3).

Teachers' focus on clock reading is contrasted with students mentioning working too slowly as a frequent reason for their own time management struggles. Some students simply stated, 'I just have been going too slow' (Student S4), and 'I just wasn't, you know, reading as fast as I usually do' (Student S6). Student S3 gives specific examples of working slow.

> ...there are some sort of hard question or something that took me longer to read or to solve. So, for ELA, might be really long passage or a question I really didn't know what it meant, so I tried and tried and tried and that threw me off because I was like, I just didn't know what it meant. So, it took me longer to, like, answer the question or for math, but there was a really hard one I didn't know how to solve that would usually throw me off at least some (Student S3).

Student C6 indicated a comparison with other students, 'I think I tend to take longer on assignments than other students sometimes.' Student C4 mentioned doing more than is needed as a problem in getting assignments completed on time, stating '...might have written too much while you didn't, you didn't have to write as much as I did.'

Both teachers and students perceive student time management struggles which can be grouped in two general categories of motivation/focus and use of time with the addition of students not understanding what is needed. Student uncertainty on where to begin may explain perceived distraction/socialization/procrastination (Rinaldi et al, 2021). How much of this uncertainty pertains to elements of time management, such as planning or estimating time, is unknown.

<u>Research Question 4</u>: What are the skills or strategies students are using for time management as perceived by teachers and the students themselves?

Teachers and students were asked what tools and/or strategies are important for effective time management. Teachers' comments fell within nine codes with the top three codes, related to time management in the classroom, indicated by five teachers each. These are:

- Notetaking skills (TC, TE, TG, TI, TJ)
- Student motivation/No excuses (TB, TD, TE, TF, TI)
- Asks questions and/or self-advocates (TE, TG, TI, TJ, CT)

Five teachers indicated that using an agenda or calendar is also a strategy used by students. Since this is a strategy for work and long-term projects outside the classroom, which is not part of the scope of this thesis, it will be discussed separately later (Chapter 5.2).

Teacher TA did not include any of the top four skills/strategies, rather emphasized skipping questions as a strategy for taking advantage of time.

> Students who know how to manage their time well, obviously are going to do better because they can use those test taking strategies to their ability. Whereas, students who don't know how to manage their time, they may take a look at one problem and spent almost the entire class trying to solve that one problem versus moving around to answer all the questions and make sure they get done as much as possible (Teacher TA).

Teacher TE included all four of these frequently identified codes. In addition, noted was that setting goals and prioritization were effective strategies. The key words are underlined.

> ...they are often the ones that are, are taking notes whether I tell them to or not…they're typically my students that ask all the questions and then ones who are all set to work. Those are typically the students that dive right in. There's no pause in between. There's no real transition time. They usually go for it right away. And those are also the same kiddos, that you know will ask questions as we work trying to work things out, and I think that they've you know, over time, I think that they are a little bit more mature, especially whenever it comes to their executive functioning skills and they are also the ones that are high achievers, who are very driven and want to do it well and do it right (Teacher TE).

The teachers' responses help to articulate what strategies they feel work for their students. This research seeks to include the perception of students, as well. Students were asked, 'What type of strategies do you use when getting assignments done in class? Strategies meaning what do you do or think about to help you get things done?' Students were also presented with two scenarios, one for a science assignment and one English and were asked to describe how they would approach those assignments. Strategies mentioned in the above discussions were then coded. Students' responses concentrated on five codes out of a developed list of nine codes.

- Just start and/or Work Fast and/or No time to plan (S1, S4, S5, S6, C1, C2, C3, C4)
- Track time and/or Time monitoring and/or Estimate time (S1, S2, S3, S4, S6, C1, C2, C4)
- Organize, read instructions, prioritize tasks (S1, S2, S3, S4, S6, C1, C2, C4)

- Focus (not-distracted)/No procrastination (S1, S2, S3, C3, C4)

Eight of the ten students interviewed discussed just getting started working, and sometimes as fast as you can, as a strategy. These eight students included four who characterized their own time management skills as 'not good' and one as 'depends,' but also three students who described their time management as good or very good. Table 14 provides transcript excerpts providing a student voice to this code.

Student	Self-Assessed Time Mgt.	Excerpts from Student Transcripts related 'Just start working' Strategy
C1	Very Good	'But if it's just a smaller assignment that we have 45 minutes to complete, I don't usually think about it. I just sort of comprehend how much time do I need to get it done.'
S6	Good	'Um, I would start working on it. And I would just try to get it done. And I don't, I don't know 40 minutes would be long enough for that for me'.
C2	Depends	'I just get started on the assignment and try to finish as much as I possibly could....' 'But if it was, if it was only 30 minutes, I'd probably just have to like wing it and go as fast as I could finish the whole thing.'
S4	Not Good	'I would just go from the beginning and if I was struggling on anything, I'd skip it and do it a bit later. Because maybe the next things can help me find out what that question says.'
S5	Not Good	'...I would just start writing...I write with no format. Just start writing.'

TABLE 14 STUDENT COMMENTS RELATED TO 'JUST START WORKING' STRATEGY

Most students described a portfolio of strategies they used for time management. This illustrated the differing EF skills involved in time management (Kaufman,2010). Since the data shows that both 'very good' and 'not good' time managers mention the same strategy of 'just' start working and work fast, looking at all the codes shows the variety of combinations of student strategies. Table 15 shows the distribution of perceived strategies organized by students' time management self-assessment.

Time Management Strategies	**C1**	*C4*	*S2*	*S3*	*S6*	***C2***	S1	S4	C3	S5
Just start working and work fast	√	√			√	√	√	√	√	√
Track time/Time monitoring/Estimate Time	√	√	√	√	√	√	√	√		
Organize Tasks	√	√	√	√	√	√		√		
Focus/No Procrastination		√	√	√			√		√	
Skipping around questions		√			√			v		
Work toward a goal or reward					√	√			√	
Ask Questions (clarification from teacher or other students)					√				√	
Take Breaks				√		√				
Checklist	√									

TABLE 15 STUDENT STRATEGIES DISTRIBUTION INCLUDING SELF-ASSESS TIME MANAGEMENT PROFICIENCY

Key: Student time management self-assessment: **Very Good,** *Good*, ***Depends***, Not Good.

All students listed more than one skill/strategy with the exception of Student S5. The following excerpt is from Student S5:

> Interviewer: So, how do you think your time management is?
>
> Student S5: Honestly, I have none.
>
> Interviewer: Ok... (interrupted)
>
> Student S5: I don't do, I do like no strategizing. Not like this, I'm gonna spend this amount doing this, this amount of time doing that.' I just I start my work and then I finished it eventually. I don't like it. The closest thing I get is if we're having trouble. Although OK, I'm done. Go work on something else and get to take a break from it and that's about it.

Students need to employ their time management skills across different academic content areas. As noted earlier, each student was described a science and an English subject area assignment and asked how they would approach it. Table 16 shows that there was a difference in strategy distribution between the two scenarios.

Strategy	Science Scenario	English Scenario
Just start working	7 (S2, S5, S6, C1, C2, C3, C4)	4 (S2, S4, S5, C3)
Planning (Often referred to as 'brainstorming' for English)	0	8 (S1, S2, S3, S6, C1, C2, C3, C4)
Track time/Monitor time	5 (S2, S3, S4, C1, C4)	6 (S2, S3, S4, S6, C2, C4)
Organize	3 (S1, S3, C2)	4 (S3, S6, C1, C2)
Read the instructions	4 (S1, S2, S3, S4)	N/A No instructions referred to
Skip around questions	1 (S4)	0
Focus	1 (C3)	1 (C3)
Ask teacher for help	1 (S5)	0

TABLE 16 COMPARISON OF STUDENT STRATEGIES USED IN SCIENCE AND ENGLISH SCENARIOS

The codes referring to planning and organization have a subtle difference, though they are often used interchangeably in everyday language. In this coding, planning is used when students are deciding what to write or more generally, what to do. For Student C1, planning involved, 'So first, I would sort of think about what was going on, brainstorming what I was going to write about..." The same student, Student C1 also had organize as a comment code. The organize code refers to arranging already determined items or thoughts. Again, from Student C1, 'Then, after that, I would start making sort of just a quick sort of outline for the essay.' This distinction between planning and

organization helps explain why there was no planning in the science example. The planning, or what to do, was provided by the teacher's instructions. Different curriculum subject areas and different teachers will have a variety of ways they present tasks which may affect how students apply their time management skills.

With the perception that time management is a needed set of skills and that there are a variety of student proficiencies and strategies, it opens the question as to where students learn these skills. When interviewing teachers using the prompt, 'Do you explicitly build time management strategies into your lesson planning or instruction?' the general responses were 'no' for instruction and sometimes it was mentioned in terms of lesson planning. The follow-on question became, 'Where do you think your students are learning these skills?' School was mentioned by four teachers (TC, TF, TI, CT) and informal education settings such as home and extracurricular activities was mentioned by eight (TA, TB, TC, TE, TF, TG, TI, CT). Regarding teaching time management in class, Teacher TI said, 'It's going to be sort of more of a basic thing, a non-academic thing that I'm also trying to teach them to manage their time and focus on what they're doing and finish something to completion.'

Home and extracurricular activities were mentioned twice as often as school and all four teachers who mentioned learning time management skills at school also commented on learning them outside of school. Teacher TI in the previous paragraph talking about teaching time management in class also said this regarding extracurricular activities and time management, 'I have a lot of kids who are into, you know, extracurricular activities...they tend to be able to manage their time better inside the classroom because it's just a skill that they have. It's something that they've learned.' Teacher TF has a similar observation, 'A lot of my students, and especially the ones that do perform well and use time really efficiently, they usually are on a pretty tight schedule, as it is, they do a lot of extracurricular activities.' Using time efficiently is also related by Teacher TB, 'I know students who are very involved in some kind of sport or activity, and they know that it's going to eat their time once they get home... So, they don't lose any amount of time they can in the classroom to crank out work.'

Informal sources of time management instruction were identified as home and extracurricular activities. For the home environment, not all teachers see it as supporting students' time management. Teacher TB observes, 'And at home, there's, there's nothing there. I mean, I'm sure every teacher has seen it where you send something home and not a single thing ever comes back touched.' Home environments are outside the scope of this research which is focused on what teacher can do in the classroom.

Relating back to where these skills are taught, Teacher TA stated, 'I can't really recall an instance of those time management skills (sub-divide time and an internal clock) being actively taught in a classroom, in a traditional classroom environment.' When asked, 'What would you think of executive functioning and time management being taught in a traditional classroom?' The response was, 'Honestly, I think it would be very, I think it would be an excellent idea because then it becomes life skills that are in the forefront of the students' minds.' Teacher TA went on to relate a personal experience during secondary school and a school-based program that 'mom encouraged me to sign up for' and it was, 'actually very helpful.' The program, AVID (Advancement Via Individual Determination) is a nonprofit organization established in 1980. 'AVID provides scaffolded support that educators and students need to encourage college and career readiness and success.' (AVID, 2021). Teacher TA describes his experience as,

> We actually did have a class like that, almost, kind of taught us about organizational skills which did touch a little bit on time management skills and also talked about college readiness. So, kind of taking those executive skills and functions that we take for granted every day because we're not always constantly aware that we're using them at some point. In order to be using them subconsciously, they need to have copied, putting conscious effort into it. So that way you develop that subconscious ability to do it. And I feel like if those skills aren't actively taught in a classroom and isn't constantly brought to the forefront of the students' mind, they're not going to be able to develop it subconsciously.

Teacher TA's comments speak to the need to teach EF formally in the classroom but may also be looked at through CLT. If time management becomes a 'subconscious' ability, or tacit knowledge, one that uses long-term memory schema, this potentially could decrease its extraneous WM load leaving more available for the intrinsic load imposed by learning novel information (Leahy & Sweller, 2016).

Students responded to a prompt of whether teachers should teach time management in class. In general, students expressed that they thought teachers should help students with their time management. However, not all students saw teacher support of time management as helpful. Seven students (S3, S4, S6, C1, C2, C3, D4) responded 'yes' and three students (S1, S2, S5) responded 'no'. Of the three students who commented 'no' the reasons were focused on social/emotional reasons rather than metacognitive. Two student comments illustrate this point.

> I think no, because most of us will not listen in the first place. Well, where I am in my school, I don't think they would listen or not care at all. But because I think procrastination is just something that teachers cannot handle. It's for the students to handle because it's an 'us' problem and not a 'them' problem (Student S1).

> Because time management is (a) crucial thing and because the teachers have to deal with their own time management, and this is as much a motivation thing as something we need to work on. It doesn't matter if you have perfect, if you have the perfectly organized work, if you're still not gonna listen to it. So, it's as much a motivational thing as it is organizational (Student S5).

Student descriptions of motivation align with SDT (self-determination theory) focusing on types of motivators (extrinsic, intrinsic) and is related to the EF skills of self-regulation and determination (Dörnyei & Ushioda, 2021; Ryan et al, 2021: Vallerand, 2021).

The teacher interview prompt sought whether teachers were explicitly building time management strategies in their lesson plans or instruction. The intent of asking this question was for teachers to address supporting these skills for students. Five of the ten teachers expressed that they did explicitly build in an aspect of time management in their lessons planning, with Teacher CT indicating that it was only for long-term projects. 'I do that for projects...I don't build it in for lesson planning for classroom activities. If things are going slowly, there are times that I'll say, "Okay, this is where you should be,"' (Teacher CT). The remaining five teachers indicated that they do not explicitly include teaching time management in their lessons. Several teachers who do not teach time management, do describe how they personally focus on their own time management when planning. For example, Teacher TA noted that, '...when I'm mapping it out for myself, I do. I don't write it out in the formal lesson plans that I submit to my supervisors. But I do try to gauge, I do try to gauge, you know, time in the beginning for a short review.' And Teacher TF saying, 'Most of my time management in my lesson plans is making sure that I'm not going to go over time.'

Several teachers (TE, TI, TJ) indicated that they do teach time management skills to varying degrees.

> If they're getting to eighth grade and they've never had to do that (time management) before, it's going to be sort of more of a basic thing, a non-academic thing that I'm also trying to teach them to manage their time and focus on what they're doing and finish something to completion (Teacher TI).

Though teachers' comments suggest that this is not common practice. Teacher TE explicitly teaches time management skills, saying, 'I do, however, still feel like not a lot of people do.' And Teacher TC, 'Nope, none that I have seen (explicitly teaching time management in the school). I don't think it's explicitly taught.'

Several teachers indicated that even though they do not explicitly teach time management, it was a positive idea. Such as Teacher TC's comment, 'I think it would be really helpful to them (students), yeah.' Teacher TE commented that,

> I find the weight a little bit different as to how we approach maybe teaching some of the executive functioning skills and time management versus how we teach, and emphasis that's put on content.

Teaching executive function in school was mentioned by two teachers as something planned for next year. Teacher TC related that during the first week of next year, students in that school will participate in EF skills classes. The course is under development, but initial plans include using and organizing email, how to create a schedule and organize homework. Teacher TD described short courses for students called 'Exploratories.' Next year, one will be focused on EF for sixth graders. The course was originally going to be called 'Study Skills', but the name was changed because the curriculum director saw the list of things of topics and suggested they look at executive function.

<u>Research Question 5</u>: What are teachers' and students' perception about time and time tools?

Teachers and students discussed if they thought they think about (perceive) time the same way. Apart from one student (C1), all participants related they thought teachers and students perceive time differently. This is supported by literature in that perception is complex and individual (Rogers, 2017). The word 'think' about time acknowledges that there is no organ which senses time, but rather a cognitive construct (Kelly, 2002). These interview responses developed six codes. The two predominant codes being students thinking about the next thing to do out of class versus teachers thinking about what to do during class, and perception depends on the situation. Table 17 shows a similar distribution of comments between teachers and students.

Teachers (n=10)	Code Description	Students (n=10)
6 (TA, TB, TD, TG, TI, TJ, CT)	Students (next class) vs. Teachers (tasks)	7 (S2, S3, S4, S5, C2, C3, C4)
5 (TB, TD, TF, TI, TJ)	Depends on the situation (or activity)	5 (S3, S4, S5, S6, C2)
3 (TA, TE, TF)	Experience	1 (S4)
3 (TA, TC, TD)	No concept of time	0
0	Depends on the person	2 (S3, S6)
1 (TB)	Sense of urgency	1 (S4)

TABLE 17 CODING DISTRIBUTION REGARDING PERCEPTION OF TIME BEING DIFFERENT FOR TEACHERS AND STUDENTS

Teacher comments included, 'In their mind, they're probably thinking like, "OK, next class, next class." Whereas I'm thinking about they have this much time to do this part of the day and then I have this much time to do this part of the day' (Teacher TB). 'I would think it's different because I understand, you know, these are the things that we need to accomplish today. This is what they need to be doing. This is, you know about how much time it should be taking. And in their mind, it's 45 minutes till lunch' (Teacher TI). From the students, the same code was expressed as, 'Because like me, students probably are thinking like when class is ending, the teacher is thinking, 'Oh, we're gonna do this at this time' (Student S2). 'I think that most students are like really, really eager to be out of school and just like go home and do whatever. But teachers are, like, using it as valuable time to teach their students lessons. I like school, but most students don't' (Student S6). Student C3 adds,

> I think most of the time when we check the time, we just want to know when class is over, but I think sometimes teachers are like, they do time to see how much time they have for to do their work until it get things done before the next class. So, we think we want to get this over with, but they might want more time so they can get more things done and explain more of our subject.

The concept that how teachers and students think about time differs due to the situation was also a common perception. This relates to Csikszentmihalyi's flow which relates a tasks' challenge and person's skill to the speed time is perceived as passing (flowing) (Csikszentmihalyi, 1977). The different situations may be a task in class such as a test. Teacher TB related, 'For me, like if they were to take a test. I know that if it's a test, our 55-minute class period is going to be tight to get that done. Whereas they may see, you know, I have the whole class period and that feels long.' Similarly, Teacher TF related, 'Like, if it's the last five minutes of a test, I think for me that five minutes pass is the same as a normal five minutes, but I think for a lot of students that five minutes probably feels like it's moving faster. And so it depends on the activity that they're engaged.' Teacher TJ commented more broadly, 'So, I think in most times, the perception is never going to be the same, because whoever is more actively thinking and doing something is going to feel much shorter than through the person kind of taking it in and perceiving it.' Students S3 and S5 are student examples of this code.

> Well, for the students it might seem longer because they're not the ones really doing anything. They're just kind of sitting there listening to the teacher lecture or do something like that, or do an assignment and you have to do work in this assignment and use your brain more. And for teachers they're teaching. So, it might seem like…a really short time because it's something they love to do. So, there are already more engaged in what they're doing, so the time seems to fly by for them (Student S3).

> So, if you have someone that's sitting, has finished their assignment, and has nothing to do, then they're bored and the five minutes feel like they're going really slowly. But if you have a teacher who's going to grade 50 assignments in that same minute of time, it's gonna feel like they have, it'll slip by really fast (Student S5).

These students are articulating different states of flow (Csikszentmihalyi, 1977) with time in the same classroom being perceived differently by teachers and students depending on the activity and their engagement with that activity.

Students using time in time management requires a concept of time. Teacher TC saying, 'I don't know if they have any concept of time' (Teacher TC) is mostly likely an exaggeration. It may be more an inexperience with time. Students, since they are younger, have less experience with using time which is a skill that develops gradually (Burdick, 2017). Teacher TD expressed it this way, 'They

really don't have a perception of, I'm not even sure if it's time, to be honest, or the responsibility piece that's associated with getting something done in a timely fashion' (Teacher TD). Three teachers and one student talked about the perceived impact of having experience with time.

> …I think adults have more, have a greater sense of time management, and that's just because we're older and we've developed. We've had more time to develop those skills than a student has...So, I think just by nature of having more experience with time and being able to measure time more accurately (Teacher TA).

> I think it's different based mainly off of experience. I think for the students, time passes very quickly when they have a deadline. In they're not as able to manage it. Where somebody with experience kind of knows that it's going to pass quicker than what we think in order for us to meet deadlines (Teacher TE).

> I think just from experience and having been a teacher for as long as I have been like doing certain activities like you kind of get a better idea of like, 'OK, this is about 5 minutes' or 'This takes about 10 minutes,' whereas the students they get lost in the activity sometimes or they want to rush through the activity and so they're hoping that the time is gone faster than it has or they don't realize that as much time is past, has passed, because they're just so focused on trying to get something done (Teacher TF).

> Because they (teachers) have more experience and they (teachers) just know like the flow of time passing and when it passes faster and when it passes slower (Student S4).

The notion that experience plays a role in using time for time management is supported by literature (Burdick, 2017) and suggests that teachers providing students with opportunities to practice will support student time management skills.

Student C1 was the one person to comment only on similarities. 'I would say "yes". I mean like when we have to complete assignments, instead of for them (teachers)...they would be thinking about when they have to be done grading assignment or checking assignments....' This continued with the following exchange:

> Interviewer: Ok, the word perception, which you probably know. Do you think you and an adult perceive time, the passage of time, the same way?
>
> Student C1: I think so.
>
> Interviewer: Okay, why do you think so? What, kind of, gives you that idea?
>
> Student C1: Because everyone learns time the same and it's the same for anyone no matter who you are. So, it's sort of, it depends on like you can use time differently, but I think we all perceive it the same way.

The concept of an internal clock (Wittman, 2017) was only mentioned by one participant, Teacher TA. This was in response to the questions of perceptions of why students struggle and expectation of student. An internal clock was mentioned four times, repeating the same ideas.

> So, I would say primarily the students who do struggle with time management. I think it's an internal clock thing, like an internal biological mechanism within themselves not being able to say without looking at a clock. How much time is five minutes, how much time is thirty minutes? How much time is one hour kind of thing you used one hour? (Teacher TA).

> ...developing an internal clock, developing an internal biological clock so they get a sense of and a sense of feeling for how much time there is even if you don't have a clock to use as a reference (Teacher TA).

This final research question explores if time tools are perceived as helpful in supporting students' time management skills and if there is a preference between analogue and digital clocks. Questions regarding time management, as relating to clock use preference, were included in the pilot study and then expanded upon during the interviews. Three Likert questions, listed in Chapter 4.1, show a similarity in responses between the pilot study and interviews with teachers and students. Time is part of the school experience from learning about time to using and managing time.

Learning how to tell time is a biological secondary knowledge (Sweller et al, 2011), a primary school mathematics standard and is often viewed as hard by teachers and students (Van Steenburgge et al., 2010). As part of the interviews, teachers and students were asked about what they remembered about learning to tell time. Eight teachers related what they remembered about learning to tell time. The only two methods of teaching recalled by teachers were an analogue clock manipulative (TG, TI, TJ) and worksheets (TE, TF, CT). These are the same types of manipulatives as described earlier (Earnest, 2017; Earnest, 2021). Four teachers (TD, TE, TF, and CT) indicated it was a difficult concept for their young selves contrasting with Teacher TA indicating it felt like it came quite naturally.

Teacher TD related a personal experience of not being able to tell time as late as fourth grade (9-10 years old).

> I remember it was in fourth grade and I did not know how to tell time and we had to sign out to go to the bathroom. And I didn't know how to tell time and I was so embarrassed to tell anybody that I didn't know how to tell time that I would look and just try to make up numbers going to whoever signed out before me (Teacher TD).

Teacher TD went on to relate not remembering when time telling was learned, but said, 'I think I hid it for a really long time.' Even today, this is an area of weakness.

> But I know I wasn't taught efficiently because when I get standardized tests and I have to write the time on the board like when they're going to be beginning, and when they're going to end, I'm always double checking myself to make sure that I have the time correct (Teacher TD).

Students' recollections of learning time specifically included first and second grades (ages 6-8 years) and seven students expressed that it was hard (S3, S4, S6, C2, C3, C4) or annoying (S5). Like the teachers' experiences, the only two methods of teaching mentioned were an analogue clock manipulative (S1, S5, S6, C1, C2) and worksheets (S3, S4, S5, C3). This may indicate that teaching practices for learning to tell time have not changed much in the last few decades.

One of the teachers (TB) provided insight from the parent perspective regarding her eight-year-old son learning to tell time at school and this past year at home, due to the pandemic. Asking about his experience elicited the following exchange:

> Teacher TB: It was good. I think they did it in a nice rolled out kind of way. I think that I would like them to spend more time on it, but he caught on pretty quickly. In first grade, they taught him like kind of, like hour and half hours. And then this year, in the second grade, then broken down into the five-minute increments. The second hand came into play. So, they did it progressively, which I appreciated.
>
> Interviewer: Did they do both analogue and digital simultaneously or did they do them one after another?
>
> Teacher TB: I didn't notice in first grade, but I did see in second grade because he was working at home. It was part of our distance learning. It started off mostly with the analogue, but then there would be pictures of the digital view, as well.

Later in the interview, more from the teacher's perspective on the eight-year old's experience with learning time.

> Like I was happy to see that my son learned the basics in first grade and continued to the second grade. And now I feel like it's probably on me to reinforce it and say, 'Oh what time is it?' like, 'How long until it's gonna be this time?' Just so that I, I feel good about sending him off into the world knowing it (Teacher TB).

Telling time and tracking time are elements of time management. The two types of clocks used are analogue and digital. Three of the Likert questions (Q1, Q2, Q3) deal with time references, checking the time or referring to time. All the teachers and students indicated that teachers refer to

time either very often or often in class. Telling time and tracking time is embedded in the daily life at school. Nine of the ten students indicated that they checked the time primarily to see how much time was left for a task or for class (S1, S2, S4, S5, S6, C1, C2, C3, C4). Student C1 indicated that knowing the time can be helpful, while students S2 and S6 indicated that it can make them feel anxious or stressed. The primary tools for tracking time are the analogue and digital clock. In the classroom, count down timers are also frequently used. In the pilot study, teacher preference of time tool was surveyed for use with their students, and why. Pilot study data showed that 109 (63%) had no preference, 42 (24%) preferred analogue clocks and 23 (13%) digital clocks. Countdown timers were not included in the pilot study but added to the interview prompts due to teachers referring to them in the pilot study questionnaire.

Clock preference of students and teachers working with students was asked during each interview. The preferences are shown in Table 18.

Interview Group	Analogue Clocks	Digital Clocks	No Preference	Depends on the Situation
Teachers	1 (CT)	2 (TE, TG)	5 (TA, TC, TD, TF, TI)	2 (TB, TJ)
Students	1 (C4)	9 (All except C4)	0	0

TABLE 18 CLOCK TYPE PREFERENCE OF STUDENTS AND TEACHERS WORKING WITH STUDENTS

In looking at the student data and analyzing the transcripts, the zero number in 'No preference' may be due to the binary nature of how the question was posed to students. For example, 'So, which type of clock do you personally like better?' (Student S2 transcript) or a longer version such as, 'So which type of clock, analogue or digital, we just went through them, do you like better? Which one do you think is better to work with for you as a student?' (Student S3 transcript). The question, as worded, asks for one or the other and does not invite a 'no preference' option. A 'no preference' response would have been readily accepted by the interviewer. However, it needs to be acknowledged that the student prompt was unintentionally biased against a no preference response. The teacher prompt of, 'Do you have a preference when working with students of using

an analogue or digital clock?' (Teacher TA transcript) does not seem to have the same binary choice bias.

When students were asked why they prefer digital clocks, all nine students indicated because they were either easier or faster or both. This is consistent with literature (Boulton-Lewis, 1997; Bright & Burton, 1994; Earnest, 2021; Friedman & Laycock, 1989). One student contributed that prevalence was a factor, 'I think 'cause I see them more everywhere now that, like technology is changing and stuff. So, I see it a lot more now than I do with analogue clocks' (Student S1). The teachers commenting on digital clock use agreed that easier and faster were positive attributes. Teacher's TG commented, 'I continue to be amazed at how little skill one (students) has for telling time with the minute and second hands.' Digital clock precision was noted by TB and TG. For a couple of teachers, it depends on the situation.

> I find that my eye goes to the analogue clock because it's the biggest one in my room. However, if I am doing something on the computer then I am going to use digital display in the corner (Teacher TB).
>
> So, visually seeing do I have a lot of time left or do I have little time left, analogue is much nicer. If you know exactly what you're waiting for, if I'm trying to find an exact difference, I need numbers (Teacher TJ).

With only one teacher (CT) and one student (C4) preferring analogue clocks, the indication is that analogue clocks are not the preferred clock type. Their observations, however, point to perceived positive attributes for analogue clocks as a visual or spatial representation of time and the passage of time, as well as 'about' or approximate time (Friedman & Laycock, 1989).

> I'm sure their (students) preference is digital. I'm sure if they're keeping track of what they're doing, that's what they're used to. Actually, going back to the analogue, why do I prefer it? I also like it because I can see where I am, what's left, as opposed to a digital clock that just gives me numbers. I like to be able to see, I'd like to be able to see the image (uses hand motions to show movement around a clock face) that shows me where I am and what's remaining, what time is remaining to get something finished (Teacher CT).
>
> 'Because when I was in school, I would just learn about that one most of the time because we don't have those ones (digital) in school and those are the ones (analogue), I look at most of the time (Student C4).

Teacher TB also noted, 'I really like it (analogue clocks), though because it has angles and I teach math. So, it's great for showing angles and I think it's also great for fractions. You don't really see that so much with a digital clock.' Supporting mathematics skills is noted in literature, as well (Berg, 2019).

Focusing on clocks as time management tools, teachers and students note the same attribute for digital clocks. They both indicate that they are easier and faster to use, also more convenient because they are on one-to-one devices, such as Chromebooks and Tablets, for students. Comparing these two tools regarding cognitive load, the digital clock with attributes such as 'faster' and 'easier' would be perceived to have a lower extraneous cognitive load.

To better understand student facility with using analogue and digital clocks, students were tasked to read the time on two analogue clocks and then add thirty minutes to that time, and to do the same with two digital clocks. The students were told ahead of time that they would be asked to explain their metacognition. Metacognition is a term proposed by Flavell (1979), referring to the awareness of one's own thinking, contents of one's conceptions and monitoring cognitive process to further learning. In this research, students were asked to explain how they calculated a future time of thirty minutes. This was posed to students as, '...the question I'm going to ask you is what's going on in your head so you can figure this out, figure out what time it is' (Student C4). Table 19 shows the codes descriptions and distributions. Not included in any code was Student S1 mentioning the mnemonic, 'The shorter hand is always the shorter word, so hour' as part of the explanation of how to calculate time.

Number of Students Describing these Metacognitive Descriptions for Analogue Clock Use	**Code Descriptions**	**Number of Students Describing these Metacognitive Descriptions for Digital Clock Use**
10	Mental Mathematics (generally, +, -, x)	10
9 (All except S1)	Visual/Spatial	1 (C3)
2 (S1, C2)	Skip Counting or Finger Counting	2 (S3, S6)
0	'Just' Read the Numbers	6 (S2, S3, S5, C1, C2, C4)

TABLE 19 DISTRIBUTION OF STUDENT DESCRIPTIONS OF CLOCK READING AND CALCULATING THIRTY MINUTES PAST THE TIME

Student explanations of their metacognition describes a visual element when looking at an analogue clock and more strictly numerical when reading a digital clock is supported by literature (Earnest, 2015). For example, Student C6 used visual descriptions when using analogue clock including, 'I imagined the larger hand going around halfway,' and '...pictured the larger hand going around to the other side and then just counted how far it was.' A spatial code was applied to comments such as, 'Well, I know for a fact, that if it's on the six then it means that it's halfway to an hour...halfway so it means thirty....' (Student C2). Another example is, 'Then I look for the longer hand which is pointing down at six means 30 when the long hand is pointing at it' (Student C1). When contrasted with reading digital clocks, Student C1 commented, 'So, first I looked at the left side and whatever time it is, there's the hour, and then you, whatever time is on the right, I would add 30. So, in this case, zero plus 30 is 30, so it would have been 5:30.'

Countdown timers as a time management tool were explored during the interviews prompted by teachers' comments in the pilot study. Timers are often recommended to support students' time management skills (Dawson & Guare, 2009; Branstetter, 2014). Research has also shown that timers support remembering to do future tasks, prospective memory (Redshaw et al, 2016). Though Student C3 indicated that countdown timers are only used for games, most teachers and students talked about them in the context of task time management. Countdown timers show the passage of time disconnected from the actual time of day. There is a range of formats from digital readouts, analogue clocks, to animated ones such as 'a fun timer where it's like a dynamite and it keeps ticking and ticking and on the last second and explodes and then you know it's time up' (Student S4). Another was, '...a visual one that I use that counts down and they can kind of see how much of the pie chart is left' (Teacher TE).

For teachers who use countdown timers, there were three expressed situations when they proved useful. The first is when time is critical or limited (TA, TD, TG, TJ). The second was as a visual representation of time (TC, TE, TG) and lastly for motivation (TI). Countdown timers emphasize duration and progress toward a goal or the end of the allotted time. Teachers indicated that they use countdown timers 'If it's actually very critical that...they stick to time. I typically will put up a timer just so we are kept to it, and I don't have to repeat myself, all the time, with how much time is left' (Teacher TJ). When teachers want to limit the amount of time, such as with a 'Do Now' activity, countdown timers were used. A 'Do Now' is typically a short desk activity for students to complete at the beginning of the class period.

> I always have a 'Do Now' that would be up at the front of the room like a warmup for students to come in and there it would be my time to walk around and check their homework assignments and also take attendance for the class and I would always have a big countdown timer displayed on the front board so that students knew how much time they had remaining to complete the 'Do Now' (Teacher TA).

Teacher TD uses times in the same way. 'If they (students) come in and I'm giving them a 'Do Now' or some kind of reading activity where I need to limit the amount of time to move on to the next activity' (Teacher TD).

Several teachers and students interviewed perceived the visual aspect as easier and faster. Teacher TE describes this visual aspect of countdown timers.

> And so, it's very helpful for my kiddos that you know, do not understand the, or struggle understanding those concepts of time because they can, they can read that pie chart and it counting down a little bit better and understand, you know, what five minutes looks like or feels like (Teacher TE).

As well as Teacher TG emphasizing, 'So I think if you're going to say we have ten minutes, one must give them (students) a visual of the ten minutes.' Students also mentioned the visual aspect as in, 'because you can see how much I have left visibly' (Student C2). Another student contributed this insight,

> So, the visual representation can help me because it was easier to look at and not have to kind of look at the numbers, analyze them and then go back to work. It was more like, look at the board, I see the picture, I'm good to go (Student S3).

Countdown timers were seen as an aid to motivation by both teachers and students. From a teacher perspective, Teacher TI related, '...if I say I'm setting my timer for three minutes, I want you guys to do it right now. They will get to work...They hear the timer…it just gives them sort of a sense of immediacy that it's not just going to linger out forever and ever.' From a student perspective, several students indicated that countdown timers are motivating. Student S4 said, 'Because then you know to hurry up…when you look up to see.' Also, 'Countdown timer, because they kind of push you. Yeah, we've used them before because those kind of push you like, go faster because you can see how much I have left visibly' (Student C2).

A few teachers used countdown timers for their own use, but not visible to students. Teacher TD uses a cell phone timer not visible to students. When asked if countdown timers were ever used for students to see, the response was, 'I have not.' Student C2 commented that, '(they)

mostly just don't put it on the board. They just set one and when it goes off. Yeah, an alarm goes off.' This seems to indicate that the teachers are using the timers for their own time management without providing it as a tool for students. It is a way of implicitly demonstrating the usefulness of counting down time, but not explicitly teaching its use as a time management tool or giving the student the benefit of using it. Teacher TE commented, '...the visual cues that we give them is very beneficial in middle school, but for some reason we drop it.' This raises the question of whether countdown timers should be utilized more in middle school classrooms.

CHAPTER 4.3 - ANALOGUE CLOCK AS PART OF PRIMARY MATHEMATICS STANDARDS

A tangential question to this research was developed after the pilot study. In the pilot study, it was noted that 63% of teachers had no preference of clock type when working with students and 13% preferred digital clocks. This suggests that 76% of teachers were either ambivalent or did not prefer analogue clock use with their students. Also from the pilot study, 61% of teachers perceived that they had students unable to read an analogue clock. These teachers were asked to provide an estimate of what percentage of their students this represented. These percentages are shown in Table 20. This data was considered along with news articles indicating that some students and adults cannot read an analogue clock (Dean, 2018; Molina, 2018). This inspired the interview question of whether analogue clock reading should remain in primary school mathematics curriculum. The response by both teachers and students was 100% 'yes' for a variety of reasons.

Percentage Range	1-20	21-40	41-60	61-80	81-100
Percentage of students teachers estimate could not read an analogue clock	36%	25%	24%	12%	3%

TABLE 20 PERCEIVED PERCENTAGES OF STUDENTS UNABLE TO READ AN ANALOGUE CLOCK (PILOT STUDY)

In response to why participants felt that analogue clock reading should remain in primary school mathematics curriculum, the majority responses fell into three categories, coded as Supports Other Skills, Analogue Clocks Still in Use/Life Skill and Visualizing the Passage of Time. Supporting mathematics skills has been found established in literature (Berg, 2019; Fitz, 2016). The distribution is in Table 21. Regarding supporting other skills, there were two participants who indicated skills not associated with mathematics standards. One teacher who indicated that analogue clocks help with

Cub Scouting skills such as knowing the time using shadows (Teacher TE). The other citing the helpfulness in understanding metaphors and analogies such as 'on your six' and 'four o'clock shadow' (Student S5). Both comments speak to cross-curriculum benefits not limited to a mathematics curriculum.

Code	Teachers	Students	Total
Supports Other Skills (primarily Maths)	8 (TA, TB, TE, TF, TG, TI, TJ, CT)	5 (S1, S3, D5, C1, C3, C4)	13
Analogue Clocks Still in Use/Life Skill	5 (TD, TE, TF, TG, TI)	6 (S2, S3, S6, C1, C2, C3)	11
Visualize Passage of Time	6 (TC, TD, TE, TF, TG, TJ)	1 (C2)	7

TABLE 21 PARTICIPANT REASONS FOR SUPPORTING TEACHING ANALOGUE CLOCKS IN PRIMARY MATHEMATICS CURRICULUM

CHAPTER 4.4 - TIME MANAGEMENT AND STRESS

The focus of this project is the pragmatic goal of exploring students' ability to complete a task within a specified time. However, though there were no specific interview prompts related to stress or anxiety, these topics did appear in participant responses. Student anxiety is also noted in literature (Tramonte & Willm, 2010; Jones et al, 2019, Owens et al, 2012). Several teacher comments related directly to anxiety and stress such as, 'They get overly concerned about the time and then stress, and then they're not able to actually do quality work' (Teacher TE), 'For the students that are lost, the time is really stressful' (Teacher TJ) and '...the slower ones the stress of trying to keep up because you said they were supposed to do whatever' (Teacher CT). Student comments also related to stress such as when a student was asked when they would check the time and the response was, 'Probably when I start feeling stressed about how far I am into it' (Student S5). These quotes suggest that when struggling with time management, stress occurs, similar to researching findings by Nasrullah & Khan (2015).

Embarrassment was also mentioned by teachers and students related to not being able to tell time on an analogue clock. A teacher related her own experience. 'And I didn't know how to tell time and I was so embarrassed to tell anybody that I didn't know how to tell time' (Teacher TD). Students also commented as seen in Student C2's comment, 'Like it's just kind of embarrassing if you don't know how to read a clock like that (analogue), and 'The teacher is usually like, 'There's a clock on the wall' or something like that, and they're like, 'Yeah, what time does it say?' and it can be very embarrassing for the kids' (Student S3).

CHAPTER 5 - DISCUSSION

'Knowledge progresses only as a consequence of discovering mismatches (actual or anticipated) between expectation and experience, and trying to resolve them' (Swan, 2003:254).

There are two aims of this research. The first aim is to explore students' time management in the classroom from both the perspectives of teachers and the students' themselves. The second being exploring various time tools used to support students' time management. This research analyzes teachers' and students' semi-structured interviews to reveal and discuss similarities and differences of perceptions. Additionally, elements of classroom pedagogy will be discussed through the lens of cognitive load theory (CLT). Originally, the difference between analogue and digital clocks was the sole focus of the CLT discussion. However, this has been broadened to thinking about extraneous cognitive loads, how teachers present tasks and support students in terms of overall student time management. As a result, CLT theory will also be discussed with skills and strategies in the classroom.

CHAPTER 5.1 - COMPARISON OF DATA SETS

In the analysis, a comparison was made between the four Likert questions asked to teachers in the pilot study (n=164-174 depending on the question), interviewed teachers (n=10) and students (n=10). Due to the sample sizes, statistical significance cannot be calculated. However, mean scores, ranges, standard deviations, and the corresponding coefficient of variation indicate the participants interviewed are similar to the larger sample of teachers participating in the web-based questionnaire pilot study. This similarity does not support generalizing this study's results to the larger population but does provide evidence that views of the teachers interviewed appear to be aligned to the larger group who participated in the web-based questionnaire.

Of the four Likert questions compared between pilot study teachers, study teachers and students, question Q2: How often are teachers perceived to be referring to time in class? has the greatest similarity of responses. It is generally recognized by teachers and students that 'very often' or 'often' teachers are referring to time. In the pilot study, 1% indicated 'never' but due to the this being from the web-based questionnaire, no additional insights are available. Interviewed teachers and students indicated that all teachers 'very often' or 'often' refer to time in class. This infers that time is part of teachers' daily pedagogy, in the planning and delivery of material to students. Likert

questions Q1: How often are students perceived to be asking what time it is in class? and Q3: How often are students perceived to be referring to time in class? also deal with time referencing, checking the time, or referring to time. This implies that teachers are regularly using time cues when interacting with students. A spontaneous example of this was an impromptu interruption during the interview with Teacher TD. The teacher interrupted the interview to speak to a class about ready to leave the room. 'Alright kids, you got two minutes. So, you can pack up. Pay attention to the schedule today. Alright, up, and I will see you later. So, in another two minutes, you can just let yourself out' (Teacher TA). Within this short quote, the teacher refers to a duration of time twice and a schedule once.

In contrast, question Q4: How often is it perceived that students are struggling with their time management? shows the greatest range of responses. In looking at the data, both sets of teachers indicated about 40% of students are perceived to be struggling 'very often'. For the pilots study, this represented 73 teachers along with four of the interviewed teaches. For the teacher interviews, all ten responses fell within 'very often' and 'often'. This is contrasted with students where only two of students indicated 'very often' and an additional two indicated 'often'. Also in contrast is the lower end of the scale, where none of the teachers interviewed indicated 'sometimes', 'rarely' or 'never.' Two of students indicated 'sometimes' and four indicated 'rarely.' This could imply students do not perceive, or choose not to reveal, that they have struggles in time management, or it could imply that they do have struggles in class but do not attribute them to time management. As noted earlier (Chapter 4.2), students perceived that not understanding what was needed was a reason for struggling with time management. Using this general information as a starting point, teacher and student interviews provide more in-depth content to discuss.

CHAPTER 5.2 - INTERVIEW ANALYSIS ORGANIZED BY RESEARCH QUESTION

<u>Research Question 1</u>: Is there a perception by teachers and students that time management, an executive function skill, is related to academic success?

Following the conceptual organization introduced in the methods section (Chapter 3.7) and used in the analysis (Chapter 4.2), a first consideration is if time management is perceived as important to student academic success. As noted in the literature review, preparing students for high school and beyond is a goal of both teachers and students with executive function skills associated with academic success (Samuels et al., 2016). Time management is one aspect of this goal and can itself be divided into smaller components such as skills, strategies and then potential

teaching practices to support growth of these skills in students. The question here is if classroom teachers' perceptions of time management match current research regarding EF and academic success. The data from this study gives strong support from both teacher and student comments that good time management is linked with academic success. This is consistent with previously discussed research findings (Alyami et al, 2021; Nasrullah & Kahn, 2015; Samuels et al, 2016). All ten teachers indicated that time management contributes to academic success as seen in the comments list in Table 11. Within teacher comments, several specific elements were highlighted as important including: test taking strategies, motivation, work quality, extracurricular activities, organizing work and managing time. Looking at this from a CLT perspective, students with good time management skills may not need to allocate as much WM to managing their time allowing more to available for intrinsic learning. This has not yet been addressed in literature and is a hypothesis that would need further research.

Assessments, including high stakes testing such as state and national tests, are a measure of academic success and the use of clocks was a recurring example given by teachers. Six of the ten teachers mentioned the importance of using clocks during testing. For example,

> You know when we have our standardized testing ... one of the things that I always see teachers doing is putting the start time, putting the end time and the amount of time that's remaining. So, in a sense, the teacher is keeping track of the time for the students (Teacher TA).

Teacher TA's comment infers that when the stakes are high, teachers scaffold students' time management by providing explicit time cues. This may be due to feelings similar to those Teacher CT expressed, 'And I don't see that many kids who appear to judge the time that they have very effectively while they're taking the test' (Teacher CT). Only one student commented on standardized testing. The comment supports the idea that teachers are more explicit about time management when the stakes are high.

> And it usually is used when we're approaching some sort of standardized testing. When they start to do, kind of, time drills so you get a grip on time management and know, like, this is how long it takes me to solve this type of equation or answer this question' (Student S3).

Framing this in terms of the CLT, testing is a time when teachers want students to maximize their WM capacity and interactions with LTM schema (intrinsic cognitive load). Providing time management support may be seen as lessening the extraneous load imposed by students tracking their own time. Since WM is limited, a lessened extraneous load leaves more WM for test

performance (Leahy & Sweller, 2016). Due to the emphasis placed on student performance in high stakes testing, this is an area of potential further research. The research question could be articulated as, 'Does the manner in which time is tracked during an assessment affect student performance?' This question would lend itself to a quasi-experiment methodology and results may inform recommendations for testing procedures.

<u>Research Question 2</u>: How do teachers and students perceive students' (ages 11-14 years) time management proficiency?

The question posed is how well teachers and students perceive students are able or proficient at time management in the classroom. Teachers had a more negative assessment of students' time management skills than the students' self-perceptions. Five of the ten teachers quickly responded 'not good' when interviewed. This quick response, however, was mediated after further discussion. For example, 'In general, I would say the time management skills are not great. I say that with an air of caution because I do have two very distinct groups of students' (Teacher TA). Four teachers' initial response was that it depends on individual students or groups of students. This existence of different proficiencies of EF skills in students of the same age is well documented in literature (McCloskey et al., 2009). This includes difficulties in the classroom of following instructions being associated with low WM capacity (Baddeley, 2007) along with the propensity for mind wandering during cognitively demanding tasks (McVay & Kane, 2012). The initial response may reflect teachers' overall perception and perhaps frustration with student time management. For example,

> In general, at this school, I would say they're (time management skills) pretty poor. They don't really have a concept. They're not at all cognizant that, that time is passing They just kind of assume it's going to, time will expand to be whatever they need it to be' (Teacher TC).

Five students self-assessed their time management skills as good, with one stating 'very good' (Student C1). Three students gave insights on how students define being good at time management, 'I'm usually able to finish things on time, if not before time. And I feel like I'm not very rushed....' (Student S3) and 'I get the classwork done in class. I don't have any extra homework' (Student S2). Student C4 included, 'I think it's pretty good. Whenever I get done early with my work, I would usually start a different homework assignment to try to get it done.' Understanding what is 'good' or 'poor' time management relies on a common understanding of expectations.

Comparing, in general, teachers' and students' assessments of student time management shows a mismatch. Teachers' comments indicate that it is a perceived weakness in students' ability while students, less so. Neither group perceives that time management skills are very good or good for all students. The perceived deficiency in student time management skills creates an opportunity to look at time management skills, teachers' pedagogy and other influences to better develop these skills. Explicit support is mentioned by Teacher TI who describes different time management capabilities in her class and her intervention.

> I think left to their own devices, it's 50/50. I mean, you always have those kids where they will sit down and they will do exactly what you ask them to do and they will use their time well. And then you have the ones that will not in any way do that unless, you know, you are right there. So, left alone, probably 50/50, but when I am there, you know, giving them directions, telling them explicitly what to do, my classroom tends to be pretty productive (Teacher TI).

What this teacher is explicitly saying to the students is unknown. It is also unknown if the teacher is directing the student task to task or including monitoring time, as well. In literature (Chapter 2.9), this distinction in prospective memory, in this case remembering to do the next thing, can be event-based or time-based (Mahy et al., 2014). What is also unknown is if the teacher is building student time management skills to be applied to future assignments.

One approach to increase development of time management skills is to explore more explicit or direct teaching of these skills similar to the benefits indicated of direct teaching of writing skills (De La Paz & Graham, 2002). Looking at time management within the context of executive function skills, each skill can be evaluated and teaching pedagogy suggested. For example, organization, planning, strategizing, goal setting and sequencing are skills which can be explicitly taught and have been shown are important skills for time management's contribution to academic success (Nasrullah & Khan, 2015). These skills can be scaffolded by teachers with the goal of having students independent of scaffolds, through fading and a shift of responsibility to the student, by the time they move to their secondary schools. These are components of time management when estimating and tracking time is included. Teachers and students participating in this study expressed that there was a benefit in teachers explicitly teaching time management (Chapter 4.2). When looking at EF's core two strands of metacognitive and social/emotional, these skills fall within the metacognitive stand and are easier for teachers to teach. They do not address the social/emotional regulation strand which is also needed. Social/emotional skills include response inhibition (impulse control), emotional control and adaptability. Kaufman (2010) states that, 'getting started on tasks and avoiding procrastination are among the most essential of all executive skills.'

Not everyone interviewed agreed with teachers teaching time management as seen by student comments related to motivation and procrastination (Chapter 4.2) as the more significant problem. Time management in the classroom is a multifaceted skill. Looking at EF skills in isolation does not address other factors which influence students' overall time management performance. Teachers can address metacognitive, but also need to include social and emotional factors. These factors include impulse control or inhibitory control (IC), emotional control, and adaptability or attention shifting (Kaufman, 2010; Miyake et al., 2000). Framing this in terms of cognitive load, the more students are using working memory to complete tasks in a timely manner, the less that is available for learning. There is a potential research area of investigating which EF skills benefit most from direct instruction or support. This could lead to the development of new or improved time management pedagogies.

<u>Research Question 3</u>: What are the classroom time management expectations perceived by teachers and students?

There was no one agreed upon one set of time management expectations from the teachers and students interviewed. The top expectations of teachers can be viewed as skills which, when successfully done, lead to good time management. These skills include tracking time, planning time, following the daily schedule, being able to subdivide tasks and estimate the time needed to complete tasks on time. This contrasts with students' perceived expectations which are predominantly characterized as getting tasks completed on time. This expectation reflects the definition of time management used in this study. Students' second most frequent response, noted by three students, is to work as fast as possible as stated by student S4, 'Try to get your work done as fast as possible and ask the teacher if you need help.'

Student C1 discussed three of the top student perceived expectations: complete tasks on time, focus/self-regulation, and track time. But omitted the expectation of working as fast as possible which could be a detriment to quality work. This student self-assessed as having very good time management indicating a feeling that expectations were being met or exceeded.

> Well, since we do a lot of assignments in class that are around 40 minutes, it's sort of, I just have had practice with it. Therefore, my brain sort is just used to the time and it just sort of, can feel it out, sort of. And just know, you know, if I'm on track, or if I'm starting to fall behind or getting ahead (Student C1).

There is an implication that this student is good at time management due to practice resulting in the 'brain is just used to the time...and can feel it out.' This may be from the practice of working within the same class period for multiple subjects throughout the school day. As noted in developmental psychology literature, this is considered an adult perspective with time something humans grow to know gradually (Burdick, 2017). Through practice in a structured school environment, this student may be more 'adult' in the ability to track time. Looking at this from a CLT viewpoint, the understanding of how time 'feels' or passes in a class period for this student, may be a LTM schema. If this is so, there is a lessened extraneous cognitive load used to track time. This student acknowledged that time management does not always go well. Distraction and not working fast enough were the two reasons that the student gave. However, if practice helps students develop the LTM schema for tracking time, research in this area could lead to teachers consciously providing more opportunities for students to practice their time tracking skills.

When looking at the students' time management expectations list, there were only two students who did not express that completing tasks on time was an expectation. One student self-assessed their time management ability as 'not good' (Student S4). Rather than finishing tasks on time, Student S4 articulated teacher expectations as, 'Don't talk while working. Don't play games. And focus.' This is in addition to the quote above of 'try to get your work done as fast as possible and ask the teacher if you need help.' This implies that speed and concentration lead to time management without understanding the skills and strategies which support completing a project on time. Student C2 self-assessed their time management as, 'I think it's okay. It depends on who I am working with, probably', and later stating, 'If I'm sitting close to someone who distracts me, then it's harder to get my work done.' Nine of the ten students indicated that distraction was a main reason for struggling with time management. Distraction falls within the metacognitive skill of goal-directed attention and self-monitoring. These skills are needed for students to initiate and sustain a task in class and check during the task for the quality of their attention, comprehension, and work on the task (Kaufman, 2010). Skills from the social/emotional strand are also needed to get tasks completed on time including impulse control and emotional control (Kaufman, 2010). These skills contribute to students resisting distractions to accomplish the task at hand.

Student S4 indicated that completing tasks on time was an expectation but added an insight about motivation. Student S4 related, 'I'm usually able to finish things on time, if not before the time. And I feel like I'm not very rushed, but I'm also quite competitive. So, I like being one of the first people to submit and kind of having clout, but still trying to do my best at what I'm doing.' In this case, being the first person to turn in an assignment is seen as an accomplishment. In the dynamics of a middle school classroom, this may imply a signal to peers that this student is able to

work faster which may further imply that this student is smarter or least works smarter. This type of motivation is successful for some students, but not all. Teacher TE related that, '... I see that in games like Kahoot! and things like that some of my higher performers typically perform very low just because of that stress of time.' Regarding teacher pedagogy for time management, it reiterates that one solution will not work for all students and knowing your students is the key to tailoring instruction.

What is missing from the student derived codes but present in the teachers', are what skills are needed to get tasks completed on time. Teachers' responses were more skill-oriented and specific than students'. Only two teachers (TB and TG) listed completing tasks on time as an expectation. Teachers focused on tracking time, following the daily schedule, subdividing tasks, estimating and planning time. Students identified the goal, get your work done on time, but not the skills needed to reach that goal. This represents a difference in perceptions of time management expectations between teachers assessing students' time management performance and the students' themselves. In comparison, students understand that getting tasks done on time is an expectation but see this as a single expectation. This leads to the question of whether teachers are articulating specific time management skills to students. Teachers often fail to clearly set objectives for students on which they are assessed (Dobbertin, 2012). Setting clear time management expectations and skills performance may benefit students.

The next question addresses what teachers and students perceive as the most significant struggles, or weaknesses, hindering student time management. Why are students not meeting teacher expectations? The top reasons are similar for teachers and students. The reasons can be grouped into two general categories of motivation/focus and understanding of time. Motivation being the opposite of procrastination and laziness. The lack of motivation and focus being the more emphasized category over an understanding of time. This can be compared to Kaufman's experience of time management deficits focused on two areas of planning/organization and limited sense of time (Kaufman, 2010). The most frequently mentioned reason from teachers was procrastination and laziness closely followed by distraction including socializing and lack of focus and self-regulation. Procrastination and laziness were noted by five teachers and three students. For students, distraction was the predominant reason. Four teachers and nine students listed distraction. A lack of motivation in middle school students is a researched phenomenon (Kiefer et al., 2014; Stykes et al., 2020). Theories such as those noted earlier (Chapter 2.7), seek to explain student motivation to better meet student needs in the classroom. Another explanation may be outside influences such as trauma (Chapter 2.8) leading to EF deficiencies that have appearance of inattention in class (Terrasi & de Galarce, 2017). The classroom is where EF delays or deficits are

often first detected due to the EF demands on students (Barr, 2018) and teachers may be unaware of underlying issues. The interesting insight from the interviews is the frequency of comments on motivation as a struggle for student time management.

The importance of motivation is explained by student S5. At the end of each interview, an open-ended question was asked seeking new ideas or comments. Most interviewees responded with no suggestions. Student S5 did have a suggestion.

> Interviewer: Okay, I've been asking all the questions, so I'm hoping you have an idea of what I'm trying to research.
>
> Student S5: Yeah.
>
> Interviewer: Okay, so my question to you is, have I missed something? Is there an observation or something you can think about that I haven't asked about?
>
> Student S5: If it is for time keeping, I would also do a bit of side research into motivation. Okay, because that helps a lot with staying on track. So yeah, motivation often goes with time keeping because the time keeping doesn't matter if they're not going to stick to it. So yeah, motivation and how often people actually stick to the plan.

The aim of this study is exploring skills and strategies of student time management. Student S5 has articulated so well that without considering student motivation, any developed pedagogy will not achieve its full potential.

Distraction was often identified as a reason for students who struggle with their time management. Much of the distraction was attributed to classmates and wanting to do something other than the task assigned. Contrasting this, Student C2 remarked,

> Another thing that is when teachers are, probably, when teachers like talking all the time, 'cause if you're trying to work and then they have to keep adding more details on the assignment, it's just hard to, like hard to keep focusing because they start talking about other things and I have to do my work and that that's why it's hard to get my work done.

Looking at this statement through CLT, this is an example of split-attention effect where information is divided by space, or in this case time (Lovell, 2020). Lovell states that, 'Students are commonly faced with information split over time when receiving instructions' (Lovell, 2020:83). Once started on the task, the teacher is adding 'more details' which causes WM memory resources to be used to process that new information while also keeping the original task and progress on the task. The extraneous load in this case is high. Teachers being aware of the split-attention effect can organize information to minimize it.

Frequently commented teacher reasons for student struggles were also in the general category of a lack of an understanding of time. Teacher comments suggest a lack of perception of time or internal clock and equally mentioned was trouble reading a clock. Students also indicated that difficulty tracking time was a struggle which they also expressed as taking too long with one item and working too slowly. This may be seen as weaknesses in the skills of time estimation and tracking. Tracking time most often involves the use of a clock or other time tool.

The code 'not being able to read a clock' refers to reading analogue clocks. It is widely acknowledged that teaching students to read and understand time on analogue clocks is a challenge (Burny, 2012; Earnest et al., 2017; Van Stennburgge et al., 2010). Though difficulty reading an analogue clock was not frequent in student comments, there were two.

> I have a couple of kids in my class that don't know how to learn the analogue, analogue clock. So, I sometimes have to tell them what time it is. So, it's kind of difficult when you don't have your Chromebook out to check what time it is, and then you have to look at the analogue clock' (Student C4).
>
> So, like even kids in my class don't know how to read analogue clocks and it's just insane, how many people don't know how to. So, I feel like it should be something that is just worked more into the curriculum and squeezed in there a little bit more than it is' (Student S3).

With analogue clocks in almost every classroom, not being able to read one would be a disadvantage. If the analogue clock is the only one available, there is the potential that wondering what time it is may exert an extraneous load.

<u>Research Question 4</u>: What are the skills and/or strategies students are using for time management as perceived by teachers and the students themselves?

From the teacher's interviews, three skills and strategies were identified which were perceived as successful for students in the classroom. These were notetaking skills, motivation (no excuses) and being self-advocates as evidenced by asking questions. Table 22 compares teachers' expectations for students with their observed successful skills/strategies for students.

Teacher Expressed Time Management Expectations	Teacher Perceived Successful Time Management Strategies of Students
Tracking Time	Notetaking skills
Planning Time	Student Motivation (No excuses)
Following the Daily Schedule	Self Advocation and Asking Questions
Subdividing Tasks	
Estimating Time	

TABLE 22 TEACHER TIME MANAGEMENT EXPECTATIONS COMPARED TO SUCCESSFUL STUDENT STRATEGIES AS PERCEIVED BY TEACHERS

There is a mismatch between teachers' expectations and the strategies they perceive in students with good time management. The successful student strategies of notetaking, motivation, and self-advocacy do not directly relate to tracking time, planning time, following the daily scheduled, subdividing tasks and estimating time. When looking at the successful student strategies, motivation, as previously discussed, is difficult to teach. However, notetaking skills and self-advocacy are skills that teachers can develop in students. By looking at teacher expectations, these skills can be taught and supported in the classroom. This is an area where teachers can increase both student time management skills and overall academic performance by explicitly teaching different strategies.

Student strategies were similar in that motivation, in terms of focus and no procrastination, was prominent on the list. The strategies and skills, however, were broad with 'just' start working and work fast as the two leading strategies equal to tracking and monitoring time. At first thought, 'just start working' does not seem like a successful strategy. Those students who indicated that they 'just started work' self-assessed their time management skills from very good to not good. It is surmised from the list that a combination of strategies lead to good time management. Each list differs with no one definitive list of needed skills/strategies identified.

Table 15 (Chapter 4.2) shows the distribution of time management skills students discussed compared to their self-assessed time management proficiency. There is no clear pattern that students who perceive themselves better with time management are using different or more skills than students perceiving themselves as performing less well. An interesting comparison is between Students C4 and S4. Student C4 self-assesses as a good time manager and lists five skills and strategies as important. Student S4 lists four of the same five. The one omitted by Student S4 is

'Focus/No Procrastination.' Literature indicates that motivation is a contributing factor to academic success which may explain the difference between these two students. Without a measure of academic success for these students, it is unknown if this is the case. Another observation is that track time/time monitoring/estimate time and organize tasks were skills of all the students who self-assessed as 'very good, good or depends.' This implies that these skills are central to student perceived success for time management.

Another example, the self-assessed very good time manager (Student C1) discussed additional strategies of organization, time monitoring and working quickly. The four students who self-assessed as good time managers mentioned a range of three to six strategies with no two lists being identical. This may be due to several reasons including the structure of the interview itself where participants discussed what came to mind at the moment or perhaps students using these strategies so often that it's not noteworthy in terms of specifically needed for time management. The data suggests that taking a moment to manage the time to complete a task is not the first response of most students. This may be an area where teacher support benefits students. For example, a teacher could, for a complex task with several steps, demonstrate how to subdivide the whole and create time estimates for each step. Due to the variations in students' abilities and the importance of autonomy, students could then do this individually rather than have one for the entire class. How successful this is for each student may provide motivation for continuing to plan at the start of a project. This is a pedagogy that could be an area of research and tested in the classroom.

As noted, 'just start working' was a frequent student strategy. However, when comparing students' responses between the science and English assignment scenarios, there are differences (Chapter 4.2, Table 16). In the science scenario, students more frequently indicated that they would 'just start working' with four of the ten students indicating that they would read the instructions before working. Checking time at some point in the class period was also mentioned by five of the students. This is contrasted with the English scenario where eight of the students described pausing to figure out what they were going to do before starting to write. Students used terms including brainstorming, getting 'my thoughts together' (Student S1) or creating an outline. The difference between the science and English strategies may be related to how the assignments were described. In the science example, the instructions state the steps and students may feel better able to get to work based on the given descriptions. This is a form of a worked example where the teacher is scaffolding the steps required for students, potentially lessening the cognitive load caused by organizing the tasks. From literature (Perry et al, 2021, Sweller et al, 2011), worked examples are seen to reduce cognitive load. For example, 'I would just go from the beginning...' (Student S4) indicating that the student is using the teacher sequence. In the English scenario, there is a

prescribed expectation of a five-paragraph essay, but the contents of the essay require individual student thought, as what each student will write will be personal to their own Covid experience. This may account to the increase incidence of students mentioning a planning step before starting work. Students may feel that the organization of their assignment is their individual responsibility as opposed to a teacher's. Time monitoring was also the second most frequently mentioned strategy. Unlike the science example, students more frequently attached time amounts to specific tasks. For example, '...I would try to be thinking of what I'm going to write for maybe five minutes, and I will actually start writing it. And I would try to get like a paragraph per twenty minutes done' (Student S6). Also, 'I'd probably brainstorm for about five to ten minutes and then I get on (writing)' (Student C4). The difference in student strategies in different subjects is supported by literature in that the same student can perform differently in some subjects compared to others (McCloskey et al., 2009). Having teachers explicitly address time management strategies across curriculum areas may help students see how a successful strategy in one subject applies to others.

Students may also be able to apply strategies used at school in other environments such as home or extracurricular activities. The definition of time management used in this thesis is limited to students working on class assignments in school, but teacher and student experiences are not similarly limited. This is similar to using interleaving to use the same skills in similar or slightly different situations, drawing comparisons on how they are used and supporting LTM schema (EEF, 2021). Both teachers' and students' interviews revealed that the use of agendas or calendars was seen as an effective time management strategy. This strategy would not be useful for work done within the class period but is useful for homework and long-term projects. One student indicated that the use of an agenda was a strategy that teachers can help students develop.

> Interviewer: For those students you mentioned, that were maybe weaker in time management, how do you think teachers could help them?
>
> Student C1: They could give them a planner to help them, sort of organize their time and organize assignments, and when they need to do it.

Teacher TI describes how agendas are used in their school more explicitly for the younger students with older students being encouraged to find planning strategies which work for them.

> ...we're just trying to transition them, to figure out what works for them and how they can take that into high school when there is no teacher standing there going, 'Okay, did you write this down in your agenda?' So, we still give the time and my team all kind of does the same thing with the board. 'This is what we're doing. This is what the homework is. So, you have time, okay, if you guys need to write this down, write it down.' And just putting more of the responsibility on them to figure it out (Teacher TI).

This is addressed another teacher.

> By eighth grade, they're (parents) really not checking it (planners) at all unless it's test grades. So, it's a transition period of where we slowly start taking hands off, especially in eighth grade. I found a lot of eighth grade parents are entering that point of, 'Hey, we're going to let you try and do more on your own with school stuff.' So, a lot more, so we expect them to use a planner to keep track of their assignments and homework and upcoming things that they need to do long term time management, with support, but to keep the planner (Teacher TJ).

An agenda or planner is used by the school in Ohio with responsibility for its use shifted from teacher to students as students progress. Teacher CT states, 'I don't do a sit down, everybody make sure you have this' because they do that in sixth grade and the scaffolding gets removed a little. There are kids who I have to prod, 'Go check your agenda and look and make sure that you've got it updated.' Student C1, who is in the same school and self-assessed as having very good time management, agrees with the value of planners.

> Well, one of the things that I think our school does really well with this, giving each student their own planner to help them remember what homework they have to do and what time, like the classes are. So that, I think is an important way to help us remember (Student C1).

The use of agendas and planners is a strategy that teachers can support in their classroom with the goal of having students do so independently before leaving for higher education. This can be viewed considering CLT. For example, when trying to remember to carry out a task in the future, by offloading that intention, by writing it down on a calendar, may reduce the cognitive loads associated with remembering it (Redshaw et al., 2018). This intentional offloading is a way to decrease extraneous load. Planning and monitoring are metacognitive skills that students need to learn and practice to avoid cognitive overloading (du Bruin & van Merriënboer, 2017; Sweller et al., 2019; Uus et al 2020). Agendas, planners and calendars are tools which can help students bridge school commitments with those outside of school.

Time management skills are needed at home, in the classroom, for extracurricular activities and eventually in the workplace. This study focuses on the middle school classroom with the acknowledgment that learning time management does not start there. It begins before students enter school. These skills are learned at home, then during primary education or outside the classroom in extracurricular activities, such as sports or performing arts. Teachers and students were asked where they perceived time management skills are learned. Several comments clearly

show a perception that it is not being taught by teachers. ‘I can’t really recall an instance of those time management skills being actively, being actively taught in a classroom, in a traditional classroom environment’ (Teacher TA). Teacher TC also stated, 'I don’t think it (time management) is explicitly taught.' Half of the teachers expressly stated that time management is not taught in their experience. There seems to be an assumption that students pick up these skills as articulated in Teacher TF’s response to whether students get explicit training or education in elementary or early middle school.

> I don't know if it's explicit, I think it's, I think there's a lot of implied training, like you're going to like, you know, you need to figure these things out. But I don't think any explicitly, take some time, say, you know, this is a skill you should be developing, planning out how to divvy up the time you have in this class so that you can, you know, meet these deadlines better. I think it's a skill. It's kind of everybody just kind of assumes it's going to be learned or picked up as they do different tasks (small laugh).

Teacher TG contrasts with stating, 'So, you have the content journey and as part of a project, you have to manage time and that’s part of the skills, that process skill that we have to teach, as well.' This describes teaching time management along with curriculum content. This inclusion of time management is echoed in Teacher TE’s observation of, ‘I find the weight a little bit different as to how we approach maybe teaching some of the executive functioning skills and time management versus how we teach, and emphasis that’s put on content.’

Teacher TE was the most engaged and positive about teaching time management in the classroom. This could be due to personal challenges and applying those experiences to teaching practice. When asked if experience plays a large part in our time management ability, the reply was, 'I do, I think having learned through both experience and being taught...the more experience we have with it, the better we’re able to manage it (Teacher TE). When asked how the teacher developed heir time management skills, the response was,

> I think through trial and error and lots of error. So, I have ADHD myself, as well as my son, so I've spent a lot of time looking into that (time management) and how to manage it. And so, I think having the life experience and having, you know, almost lost time in a sense, has kind of forced me into looking into it and seeing how I can do it better and learning some of those skills (Teacher TE).

Inferring from this statement and interview, because this teacher struggled personally, this teacher has been motivated to become better informed about executive functioning and time management and use it in the classroom.

Several students said that time management is not taught in the classroom. Student S3 stated it this way, 'So, it's kind of a combination of the kids discovering it (time management skills) on their own and the teacher is kind of coming to help with it.' Student C2, who self-assesses their own time management as 'not good', commented,

> I think they (teachers) expect us to like set, like, our own schedules and like get everything done on time. And honestly, I think they expect a lot of us because they don't really help us out with time management. But it mean, it's just kinda hard.

Student C2 is broadly aware of the expectations of time management but does not perceive any support from teachers. This may be a difference in what is explicitly taught to students compared to what teachers are implicitly demonstrating. In the writing study mentioned earlier (De La Paz & Graham, 2002), explicit teaching had a positive result. There are many mentions of teachers being implicit with time management as seen through lesson planning, time reminders, homework reminder boards and modeling time management skills, but few related to explicit teaching. Elements of time management are tacit and can be conveyed tacit-to-tacit by modeling or tacit-to-explicit by including 'think aloud' strategies (Silby & Watts, 2015). Students being aware of teachers' high expectations was perceived by students as the teachers caring about them and their future success in a motivation study by Kiefer et al (2014). Explicitly setting expectations, including learning the skills to support those expectations, may promote student time management development.

Looking toward future classroom practices, several teachers indicated that being more explicit would be helpful. For example, when speaking about countdown timers.

> Oh, I don't probably do it (incorporate time management) at all for them. Honestly, I would like to be better at that...I'll say, 'I'll put on my timer.' I'll it put on my phone but that's not quite as visual in my pocket. You know. So, I think being more obvious with it, I think, would be helpful (Teacher TC).

When Teacher TC was asked about explicitly teaching time management, the response was 'I think that would be really helpful to them.' In Teacher TC's school, there are plans to teach executive functioning skills next year. 'It's actually one of the things that I proposed for next year that we spend the first week doing executive functioning skills' (Teacher TC). The course is under development with initial plans including using and organizing email, how to create a schedule and organize homework.

This is one of two schools which were adding executive functioning into next year's plans. Teacher TD indicated that their school is creating an elective course as part of their overall elective

courses, called 'Exploratories'. The new 'Exploratory' is for sixth graders (ages 11-12 years) on executive functioning. These two examples suggest an increased awareness of executive functioning in schools and an emerging perceived importance of teaching EF more explicitly.

The student interview prompt questioning whether teachers should teach time management in the classroom received varied responses. Student S3 (self-assessed relatively good time management) felt strongly that teachers should.

> ...only a few of them (teachers) give you tips on how to do time management...they haven't taught us like life skills, like how to do time management or how to meet deadlines and taxes and other things like that, that are central for knowing time management and things like that because it comes into real play in real life and a lot of my class doesn't have the life skills to do it. And it's very, very important, So, I do feel like they (teachers) should teach it much more than they do.

Beyond schools, students are learning about time management through extracurricular activities. Seven teachers and three students mentioned extracurricular activities as a source of time management training.

> I think for a lot of those students, a lot of that, the planning and strategizing how best use time is definitely learned behavior from the number of activities they do outside of the class. As much as I'd like to think that like I do teach those skills, I think some of those kids just have it kind of implanted on them, so much more outside the classroom than inside the classroom. And before they're even get into my classroom, there already, are kind of very strictly scheduled, scheduled so they know that they need to make the best use of their time, be it for leisure or for work to get the most out of it (Teacher TF).

These extra-curricular activities give students experience with time management and practice in how to manage their time. In other words, building an understanding of time through experience. The role of extra-curricular activities was not anticipated to be a significant part of classroom perceptions and not included in the literature review. Using a poll, Strom et al (2016) surveyed time management experiences with 240 middle school students. This age group was selected because new or increased concerns about managing time can result in anxiety and academic struggles (Strom et al., 2016). This study concluded that when schools and students work together, improvements in student and school planning can be made. These areas included amount of sleep, scheduling tests, times for extracurricular activities, reducing stress, time for skill development and planning, as well as helping students improve time management habits (Strom et al., 2016). The influence of lack of sleep was also noted in Alyami et al (2021) and a students' perception relating to their inability to manage time. The Strom et al (2016) poll found that 57% of students felt that their daily schedule

was ‘always’ or ‘often’ rushed (Strom et al., 2016:48). For example, ‘when teachers are pressured to have students reach goals in less time than is necessary, the result is unreasonable expectations' (Strom et al., 2016:48). Taking time for students to identify goals, gather information and plan, are all EF and time management skills which benefit students. Strom et al states, ‘...helping them (students) to improve time management habits is a daunting challenge’ (Strom et al., 2016:48). This research looked at the allocation of time for non-academic activities, such as social media and extra-curricular activities, competing with academic work. There are many ways to look at student time management, all of them can be a ‘daunting challenge’ when trying to support student growth.

The above comments highlight that there are perceived student time management expectations with these skills and associated strategies not regularly explicitly taught to students. Extracurricular activities and home are effective places for learning these skills. Teachers, however, cannot affect those environments and external expectations may not align with classroom expectations. Students do not have equal access to extra-curricular activities or support of families. A starting point for improving time management skills may be having them explicitly taught by teachers in the classroom. Skills such as tracking time, due dates, planning time, subdividing tasks, and estimating time align with teacher expectations expressed by interviewed teachers for early adolescent students. This conclusion is supported by Strom et al’s (2016:50) stating, ‘Greater attention should be paid to teaching non-academic lessons that influence success. One of these lessons is time management. Adolescents need to improve time management habits so education becomes their priority.’

In order to develop education pedagogy for teaching students time management, the term needs to be more precisely defined. What does time management mean? For this study, looking at time management in terms of executive function skills provides a framework to help support students complete assignments within the teacher specified time. But the individual skills are not clearly defined. What does it mean by 'planning time' in practical terms of skills and strategies appropriate for early adolescent students? What are appropriate supports to aid students in tracking time? Countdown timers were a tool many teachers and students saw as helpful. An area of potential research would be to compare cognitive loads of analogue, digital and countdown timers for early adolescent students.

With teachers overworked (Shen et al., 2015; Morris, 2021) teaching their content area, additional curriculum is often not welcome. Time management education can complement any content area. Teacher TE expresses this concept.

> I think that we as teachers can also use kind of our content as a tool to help them (students) learn those (time management) skills. Because you know, they may or may not use our content, but they will absolutely use those skills and I think that sometimes we as teachers struggle seeing that.

Teacher TE goes on to give a classroom example of what could be done with students saying, '…and so maybe today is our focus is, you know, I don't know, getting started within five minutes or putting something on their calendar for a 'To Do List' or setting reminders for, you know, certain work periods….'

Executive function skills, in general, 'need to be progressively challenged as children improve with repeated practice a key component' (Diamond, 2012:335). This would imply that school-wide initiatives with teachers across subject areas supporting time management skills would be effective for students. This is also supported by Vygotsky's emphasis on the importance of cross-curricular learning by students in developing skills (Aubrey & Riley, 2019).

<u>Research Question 5</u>: What are teachers' and students' perceptions about time and time tools?

Before discussing time tools, time perception will be addressed. The teachers' prompt asked, 'Do you think your perception of time is the same as your students?" with the student prompt similarly worded during the interview. When 'perception' was not clear as a vocabulary word, 'Do you think teachers and students think about time the same way?' was used. The dominant response of teachers and students perceiving time the same way was 'no'. Two related codes looked at comments related to different concepts regarding perception. The first describes different perceptions of teachers and students on what needs to be done in class. For example,

> I would think it's different because I understand, you know, these are the things that we they need to accomplish today. This is what they need to be doing. This is, you know, about how much time it should be taking. And in their mind, it's forty-five minutes till lunch (Teacher TI).

Students also referred to differences in teacher and student perceptions (Table 17). These included: 'Because like me, students probably are thinking like when class is ending. The teacher is thinking, "Oh, we're gonna do this at this time"' (Student S2). 'I think most students are like really, really eager to be out of school and just like go home and do whatever. But teachers are like using it (class time) as valuable time to teach their students lessons' (Student S6).

From experience, most people perceive time as valuable and have experienced it passing more quickly or slowly. The second code looks at activities more broadly and what makes the perception of time seem faster or slower. Student C4 relates, 'I think, probably for an adult it takes a faster time while the kids are a bit slower because they watch the teacher explained stuff and they like wait while the teacher is talking and not really thinking about time' (Student C4).

Taken all together, teacher and student comments highlight that they are often working from different perspectives, which may conflict when looking at time management expectations and strategies. The common themes are consistent with literature in that time seems to go by faster when you are busy or under pressure, i.e. in testing situations or when trying to meet a deadline (Wittmann, 2017). Examples of these can be seen in the passive versus active examples given by both teachers and students. Enjoyable activities or activities characterized by Csikszentmihalyi's flow of high challenge and high skill (Csikszentmihalyi, 1997) seem to go by without noticing time passing. For time management, however, time flowing without noticing may not support successful completion of a task on time. It is a benefit regarding motivation and engagement. However, without tracking time, a student 'in flow' may use more time than is allocated by the teacher for the task.

For time management in the classroom, an awareness that students may be perceiving time differently is important for teachers' perceptions of their observable behaviours. From a time management perspective, looking at EF skills, task initiation may be delayed when students feel that they have more than enough time. Task persistence may also be affected along with goal directed attention towards task completion. These EF skills are all incorporated in the practical term of time management and are potentially affected by student perceptions of how much time is available. For example, when twenty minutes is perceived by a teacher as a short time to finish a worksheet compared to a students' perception that twenty minutes is very long and more than enough time, this disconnect can lead to students not fulfilling teachers time management expectation of them. An example from Teacher TA's comments,

> Being a teacher, ten minutes feels way too short. You know...it's hard to demonstrate a full concept or a full less in a ten-minute period. Whereas, if you tell a student to complete an assignment within ten minutes, they may sit there and say, 'Oh, this is going to go on for a very, very long time.'

This is another area where practice may support students' ability to track time, gain more experience with the passage of time and what can be accomplished during that time.

Building on the idea that time is perceived differently, what can teachers do to facilitate a common time reference. One aspect is a concept of time. Students have a concept of time, biologically primary knowledge, but the amount of experience is less than teachers'. Teacher comments such as, 'I think just by nature of having more experience with time and being able to measure time more accurately' (Teacher TA) and 'Where somebody with experience kind of knows that it's (time) going to pass quicker than what we think in order for us to meet deadlines' (Teacher TE). This is also seen in the student perspective of, 'Because they (teachers) have more experience and they just know like the flow of time passing and when it passes faster and when it passes slower' (Student C4). Considering the concept that humans gain a perception of time gradually (Burdick, 2017) along with perceptions expressed in these interviews that experience is a contributing factor to understanding time and its use in time management. This points to the value of teachers providing more opportunities for students to gain experience. This goes back to time being biologically primary and secondary knowledge. Knowing that time passes is biologically primary and the longer a person is alive, the more experience they have using that knowledge. How much time a specific activity takes would seem to be biologically secondary knowledge and can be taught and supported by teacher practice. An area of further development could address the research question of whether a concept of time be developed through pedagogy for early adolescence students? If so, how would teachers do this in the classroom?

Time tools, such as clocks and timers, are needed to track time. For most people, an internal clock is not enough. Of the classrooms represented, except for one, all had analogue clocks on a wall. Analogue clocks were not the preferred time tool for either teachers or students. The teachers tended to have no preference of clocks when working with students and students overwhelmingly preferred digital clocks. Easier and faster were the primary reasons why which is supported by six of ten students describing telling time on a digital clock as 'just reading the numbers.' From a CLT perspective, this may imply that digital clocks impose less of an extraneous load than analogue when telling the time which is supported by research on the cognitive demands (Friedman & Laycock, 1989). The redundant information displayed on an analogue clock (Bright & Burton, 1994) may impose a larger extraneous load when compared to a digital display.

When students were asked to describe their metacognition when reading the time and adding thirty minutes, the strategies most often used where mental mathematics, visually or spatial references, skip counting by fives or finger counting, and 'just' reading the numbers. These descriptions were developed during the coding process of this study. There were similarities between this study and the one performed by Boulton-Lewis et al (1997). Skip counting matches the strategy Boulton-Lewis et al found students were using, described as incrementing in fives and/or

ones (Boulton-Lewis et al., 1997). Boulton-Lewis used a strategy termed 'identified hands' which was also seen in this study, such as 'The shorter hand is always the shorter word, so hour, minute' (Student S1). When evaluating the project codes of visual/spatial in terms of landmark times, seven of the nine student transcripts contained comments which describe landmark times. For example, '...the long hand points to the six and indicates it's thirty' (Student S4) and 'You pretty much look at like how twelve is usually zero, three is fifteen, six is thirty and nine is forty-five' (Student C4) supporting that it is a frequently used strategy. These visual shortcuts used with analogue clocks may represent a lessoning of cognitive load by utilizing LTM schema. Landmark times may represent these schemas. For students struggling to read an analogue clock or do not use them often, these LTM schema may not be developed, creating more cognitive load on working memory.

Cognitive load theory is applied to the 'novice' learner meaning learning new information or a skill. Learning to tell time is not a new skill because it is taught in early primary school, but some students still be struggle with mastery. This is supported by the pilot study where 61% of U.S. teachers who responded that they had students who indicated they could not read an analogue clock. The estimated percentages of their students ranged from 1-20% to 81-100% as listed in Table 20. Interviewed teachers and students also indicated that they perceived students unable or struggling to read analogue clocks. Though not providing an actual number, Student S3 contributed, 'So, like, even kids in my class don't know how to read analogue clocks and it's just insane." Three of the six teachers indicating that they see students struggle with analogue clock reading noticing this while the students were signing out to use the restroom. One could question if this is the only time students are looking at the classroom analogue clock since there are other clocks available on their desktop devices. Digital clocks are available to many students with the technology used in classrooms today, such as Chromebooks, tablets, etc. Digital clocks were preferred by the students interviewed because they were 'quick and easy' to read.

CHAPTER 5.3 - PRIMARY MATHEMATICS STANDARDS

Analogue clock reading is part of primary mathematics measurement standards. However, for some students in early adolescence and older, the facility to read analogue clocks is weak or lost. The prevalence of digital clocks may hinder development of the skills needed to use analogue clocks. This research indicates that most teachers do not have a preference between using analogue or digital clocks with students and students overwhelmingly prefer digital clocks. It could be inferred that analogue clock reading is no longer a needed skill. This inference was not supported by teacher

and student interviews. All teachers and students indicated that analogue clocks should remain as a curriculum standard. The reasons for retaining analogue clocks included that they are still ubiquitous in our society, making it a life skill. Student C3 referred to them, 'real clocks.' This agrees with Levinson's statement that analogue clocks are so 'entrenched' that they cannot simply' be discarded (Levinson, 2004:15). The other two prevalent reasons were that analogue clock reading supports other mathematics skills and are better at showing the passage of time. Teacher TE relates,

> ...just being able to associate value with numbers, that one unit or that one is five units of measure...it's transcendent to many different math skills...sometimes our kids are lacking that, very basic skills that make it more difficult for them to go forward the deeper that they go in math.

Several students related that it helps with learning to multiply or 'how to count by fives, tens and thirties' (Student S3). This second reason, visually representing the passage of time, is potentially important for developing time management skills in students. 'I think it's a better representation of the passage of time than a digital clock,' says Teacher TC. And Teacher TD, '...it's more visual...with this (analogue clock) you actually see the passage of time. It becomes...it makes time more tangible, almost.' Five teachers mentioned a 'passage of time' which is contrasted with no students using that term, in any context. This implies a difference in how some teachers are viewing the benefits of analogue clocks compared to their students.

CHAPTER 5.4 - TIME MANAGEMENT AND STRESS

Time management has been associated with motivation, as well as stress and anxiety. Literature supports that motivation contributes to academic achievement (Cohen et al., 2020; Styke et al., 2020; Meltzer, 2001) whereas stress and anxiety do not (Alfonso & Lonigan, 2021). As stated previously (Chapter 4.4), stress and anxiety were not the focus of any of the interview prompts. However, comments related to these emotions occurred in the context of student struggles. The comments ranged from 'Some students get really freaked out' (Teacher TJ) to 'Some students are like really stressed. They want to make sure their work is done and other students are really relaxed about it' (Student S6). Teacher TA related an interaction with a student from the day before.

> And I can see one of the students who was in the room with me yesterday, visibly getting upset and visibly getting stressed and I got me curious. So, I went back to look at, you know, how she had been doing during the week, kind of looking at the big picture time management thing and I noticed that none of the homework that she was assigned during the week were complete (Teacher TA).

Teacher TC spoke of one particular student, '...she has all sorts of issues because the anxiety level in her life is so high because she's so worried that she's not going to get stuff done.' No matter the level of stress, it is a consideration for classroom teachers.

The use of timers was viewed as a helpful time management tool. This may not be true for all students. This is articulated well by one of the teachers interviewed speaking about students who struggle with time management in class. '... maybe not having that timer because it almost makes them panic. And they get overly concerned about time and then stress and then they're not able to actually do quality work' (Teacher TJ). This same teacher also noted that higher performing students participating in games, such as Kahoot!, perform very low because of the stress of time. This highlights the individuality of the learner, their cognitive development, and emotions which teachers must respond to daily in their classrooms. Timers may not necessarily be a helpful time management tool for all students. Conversely, stress and anxiety may not necessarily be caused by a timer, even if a timer is mentioned, but may be from another unnamed source. The relationship between cognitive load and anxiety is an area of research, such as looking at whether engaging in a cognitive task can alleviate anxiety (Vytal et al., 2012). This would have applications in the classroom. There is contrary thinking regarding cognitive load and anxiety including the processing efficiency theory noted earlier (Chapter 2.8) where anxiety impairs cognition when cognitive demands are high and findings that suggest when demands are high, this takes cognitive priority over anxiety (Vytal et al., 2012). Findings suggest that there is a point where increased cognitive load is less affected by anxiety than at lower loads (Vytal et al., 2012:849). Regardless, the interaction between anxiety and cognitive load which impacts working memory and learning needs to be considered by classroom teachers.

CHAPTER 5.5 - IMPLICATIONS FOR TIME MANAGEMENT PEDAGOGY

Teachers, by the nature of their profession, seek to help students grow and develop. This research supports the perception that time management is involved in student academic success. Teaching EF skills explicitly enhances student their development (Dawson & Guare, 2009). Teachers are able to articulate their time management expectations for their students. It further reveals that most teachers feel that a significant portion of their students are not meeting those expectations and many students perceive themselves as not meeting those expectations. What can teachers do to narrow the gap between what they expect in terms of time management and those students who are below expectations?

The simplistic answer is to teach students time management skills. Teachers can include developing these skills as part of their lesson planning. Finding resources to help teachers develop time management pedagogy is not as simple. Many teacher preparations textbooks do not have time management listed in their indexes (e.g. Carrol & Alexander, 2016; MacBlains, 2014; Sellars, 2017). As a teacher seeking resources, the index would be a logical place to look. However, browsing the shelves of the university library containing teacher resources revealed book after book where time management was not listed in the index. Three books were located which had time or time management in the index. Kyriacou's (1998) *Essential Teaching Skills* has two paragraphs on student time management (Kyriacou, 1998:55), one paragraph about time management for group work (Kyriacou, 1998:58) and two and a half pages on how teachers can personally work on their time management (Kyriacou, 1998:127). Also, by Kyriacou (2009), *Effective Teaching in Schools, Theory and Practice,* has 'time on task' in the index and discusses student engagement. Petty's (2004), *Teaching Today,* does have time management listed, but this is for teachers. This does not represent a systematic or comprehensive search, but a practical exercise of what a teacher who is looking for time management pedagogy resources might reasonably do.

In teaching time management, there are elements that are explicit, implicit and tacit. Teachers can explicitly support student time management by verbally providing scaffolds of dividing up large tasks and assigning time goals along with a tool, such as a clock or time, to track the time. This reduces the extraneous cognitive load as students are learning these skills. When teachers recognize that expectations are assumed, but have not been explained to the students, implicit knowledge, they can articulate those making them explicit. As addressed earlier, perception of time is tacit knowledge. Teachers can facilitate converting using time to explicit knowledge by modeling 'think-alouds' with students, reciprocal 'think-alouds' with students sharing their thoughts reinforcing the acquisition of this knowledge.

The development of a comprehensive time management pedagogy would benefit teachers but is not within the scope of this project. With that said, there were some suggestions voiced by teachers and students during the research interviews. These include the use of timers, such as Teacher TC, 'You know the timer is up on the screen and I think that's a good technique....' Or as Teacher TE indicates it can be something simple.

> I think cueing them in on some of that time awareness could be as simple as, you know, if you're not to this problem by this time, then you know, then you're falling a little bit behind, and maybe you need to make sure and focus, or if you need help, you know, raise your hand and I can come by.

For large or multi-step assignments, as well as long-term projects, helping subdivide tasks such as Teacher TG, '…we have milestone submissions...and I think that helps them manage time, that manage their deliverables and so forth.' This is echoed by Teacher TI who gives students, '…tips on how to break things up so it's not so overwhelming.' Teacher TJ notes that helping 'students with time management was less about the time portion and more about the tasks portion.' Student C3 describes a large assignment that was made easier by the teacher giving milestone due dates. 'Our teacher gave us like a couple of days to do research...and then check it...then she'd have us like print everything out...set it on our board...And then she would approve it. And then that was it. Then, we're done' (Student C3). This is an example of a teacher scaffolding time management, similar to a CLT worked example (Lovell, 2020) in breaking the larger task down into smaller steps, explaining each step and providing an amount of time to complete each step and checking for understanding. Teacher TA commented on reminding students, 'Don't forget, you can always jump around from question to question. Do the easy stuff for you first. Do the harder stuff for you later.' Student S4 had a different approach of, '...just telling them to get small tasks done before doing more longer tasks.' This speaks to prioritization of tasks.

Regarding focus, Student C2 suggests that teachers, 'Make sure everyone has your attention when you're giving instructions.' Student S3 simply states, '...teaching kids how to like stay focused on something would help.' Or Student S6 who advises teachers with, 'Just reminding the students when they're doing something that they shouldn't be. Probably that's the best. I don't know.' Teacher TI is also working on focus with her students, 'I'm also trying to teach them to manage their time and focus of what they are doing and finish something to completion.' Student S5 sets up the challenge that, 'Basically, they (teachers) would just need to find ways to motivate them (students).'

As for pedagogy, Student C2 has a suggestion of practicing time management with teacher created scenarios.

> And they could also try doing things like, just set up situations on something like you have a deadline to do this. You have X amount of days and it is like a five-page essay that you have to do. How would you use your time? How would you utilized your time to be able to get it in time and make it make sure that it was top-notch writing and everything. So, they could run like set up situations and things like that. That would probably help with a lot of time management for my class.

Examining this list reveals many connections to EF skills. The use of timers and time cues is time management as defined as an EF skill of 'time function cues monitoring the passage of time...or cues the use of time estimation routines' (McCloskey, 2009:42). Subdividing tasks and prioritization are associated with organization, planning, goal setting, and strategizing, as does the use of agendas

and planners. Focus and motivation require EF skills which are metacognitive such as task initiation, task persistence, goal directed behaviour, and time management along with social/emotional skills such as response inhibition, emotional control and adaptability. Working memory is needed throughout. Teachers have an opportunity to help students meet classroom time management expectations and strengthen their EF skills.

CHAPTER 5.6 - EXCLUSIONS AND LIMITATIONS

This is a small-scale, exploratory research project and not intended to be a comprehensive analysis of all aspects of time management, executive function, middle school students or time tools. Additionally, there were aspects intentionally excluded. These exclusions include research focused on students with ADHD or other learning disabilities, including executive dysfunction and dysexecutive syndrome. The influence of parents and home on students is mentioned but not developed fully as it falls outside of the research definition of time management. Also, not within the scope of this research was time management for long-term projects. This topic was mentioned by both teachers and students, frequently in terms of agendas and planners, but was outside the scope of time management in the classroom and not examined in detail

This research occurred during the Covid-19 pandemic, but the pandemic's affect on students was not the focus and not addressed. However, several students were still or recently in a virtual or hybrid learning situation. They were asked to remember how it was in a traditional, in-person classroom. Since these students were not currently in a traditional classroom setting, their descriptions may not have been as accurate as compared to if they were currently in school. It is unknown how this may have affected their responses. Covid-19 did have a positive benefit to this research. During the pandemic, virtual learning was the norm for most U.S. students. Students and teachers became familiar with MS Teams and similar virtual meeting platforms. By the time of these research interviews, all the students had prior experience talking with a teacher online. The accessibility to and familiarity of online meetings for participants facilitated both geographical range and ease of interviewing.

Small-scale research projects often have similar limitations such as small sample sizes and self-reporting data (Kelly, 2003; Kelly, 2004a). These limitations also apply to this project and limit the generalizability of the findings. Determining appropriate sample sizes depends on a number of factors including the research purpose, question and design (Cohen et al, 2018). This research is exploratory, primarily quantitative with no aim to determine statistical confidence, but with the goal

of informing future research. Exploratory interviews tend to be heuristic, collecting ideas rather than statistics (Oppenheim, 2000). Three approaches to determining sampling size are statistical, cumulative, and pragmatic (Denscombe 2017). This research has taken a pragmatic approach taking in consideration the purpose, question, and design, combined with considerations of time and access to participants. In general, qualitative research utilizes small sample sizes (Cohen et al, 2018). This research includes two types of participants, teachers and students. By design, an equal number of teachers and students were interviewed to support a balanced representation of the two perspectives.

There are limitations to using exclusively U.S. participants for this research. Additionally, the only comparison to another country's mathematics standards was to the U.K., giving a limited, Western world perspective. This data is limited to one country which provides some consistency. However, in the U.S., individual states select their academic standards which leads to variation between states, as well as the variations between schools and, indeed, individual teachers. For this study, nine states were represented. Of these nine states, seven adopted Common Core Curriculum Mathematics standards in 2010 (Common Core State Standards Initiative) with Florida and Texas the two exceptions. A comparison with Florida's mathematics standards for elementary school show that they are identical to the Common Core State Standards (Florida Department of Education) regarding reading and telling time. Texas' comparable standards include the addition of learning the time to the nearest minute for second graders, a year earlier than Common Core Curriculum Mathematics, as well as adding and subtracting time in the third grade and calculating problems with intervals of time in the fourth grade (Texas Essential Knowledge and Skills – TEKS). For this research, the similarities of the standards are greater than their differences with variability between schools and teachers representing the greater opportunity for differences in how time standards are presented to primary school students.

CHAPTER 6 - CONCLUSION AND FUTURE RESEARCH

'The whole of science is nothing more than a refinement of everyday thinking'
(Einstein, 1936:349).

Time management, for this study, was defined as students using time efficiently to complete assignments within the teacher specified length of time. The scope of the semi-structured interviews spanned perceptions about time, academic success, classroom expectations, proficiency, skills, struggles, as well as clocks and timers as time management tools. This represents a broad set of topics which were discussed in terms of agreement and disagreement between teacher and student perspectives.

Teachers and students agree that time is often referred to in the classroom and that time management is perceived as contributing to academic success. Simply stated, teachers and students are aware of using time and its importance in their school day. There is also agreement that a significant portion of students are not proficient in time management as perceived by their teachers or self-assessed. Half the teachers responded that their students' time management was 'not good' and half the students self-assessed as 'depends' or 'not good.' It should be noted that several teachers described two groups of students, those doing well or meeting their expectations for time management and those who are falling below expectations. This represents an opportunity for improving education practice based on time management being perceived as important and students perceived as not performing well.

Meeting teacher expectations is one measure of student proficiency. For expectations to be most effective, there needs to be a common understanding of what they entail. This research showed a mismatch between teacher and student articulation of expectations. The teachers' list was mostly skill based with tracking time, following the daily schedules, subdividing tasks, estimating time and planning time. This differs from the student list which consists of a goal of completing work on time, a strategy of working as fast as possible and a behavioral element of staying focused, along with the one shared skill of tracking time. A suggested first step for teachers seeking to improve time management in their classroom would be to build a shared set of expectations. Executive function skills are a suggested framework for articulating the skills needed to successfully complete a task in the assigned amount of time.

In exploring perceptions of why students fall short of meeting time management expectations, teachers' comments fell within the two categories of lack of motivation and/or focus

and difficulties tracking time. The students' comments fell into the same two general categories with the addition of being unsure regarding what was needed or said. Motivation is a recognized and researched aspect of early adolescents. Procrastination and distraction were words frequently used by both teachers and students during the interviews. Building on the research of Rinaldi et al (2021), discussed in Chapter 2.7, strengthening time management may decrease procrastination. Their research suggests that those who have good management skills, such as organizing their time, are less likely to 'push off a task' or procrastinate (Rinaldi et al., 2021:703). This again supports the development of pedagogy for time management and the associated EF skills.

Difficulties in tracking time is an area of time management that may be supported in the classroom with the use of clocks or timers. Most teachers expressed they had no preference for clock types (analogue or digital) when working with students, contrasted by students overwhelming preferring digital clocks. Timers were a frequently used tool. When clock type is viewed as a cognitive load, digital clocks are perceived as quick and easy by students in telling the time. Timers are also viewed as easier for students to use. The use of timers can be viewed as a scaffold to help students monitor time and reducing the cognitive load of tracking time on a clock. This is similar to other instructional practices as part of CLT (Van Merriënboer et al, 2003). Working with the assumption that stopping to determine the actual time or amount of time left to complete a task exerts an extraneous cognitive load, timers may exert the least by showing the amount of time remaining. Telling time with a digital clock would also have a reduced cognitive load compared to an analogue clock for a novice learner. Research into the use of clocks and timers for time management would be needed to determine the comparative differences in cognitive loads. In the meantime, timers are already used by classroom teachers with positive feedback from both teachers and students.

The perceived skills required for effective time management were different between teachers and students. Teachers focused on notetaking along with social/emotional aspects of motivation and self-advocacy in terms of asking questions. Students shared the perception that motivation was important, with the rest of the focus on 'just start and work fast', tracking time and organization, including reading instructions and prioritizing tasks. Many of these skills are EF skills. Time management is often listed as an EF skill with a narrower definition of estimating and using time. The colloquial use of the term 'time management' in the classroom is used more broadly, inclusive of more skills. For looking at time management as an overall skill for students competing tasks, all the EF skills listed earlier are involved to different extents. Researchers and teachers could look at how each of the individual EF skills contributes to student success in time management as a format to supporting students. For example, the interplay between planning and task initiation. Can

teacher pedagogy help students understand when it is advantageous to stop and plan before they start a task? How do we teach students that focusing on a task, task persistence and goal directed attention, while tracking time leads to successful completion of a task within the time specified? How can teachers scaffold students through providing means such as feedback, hints, instruction, modeling and questioning (Van de Pol et al, 2010) to support their time management? These, and others, are questions which suggest that exploration of time management may lead to effective practices in the classroom.

This research used a combination of frameworks to explore time management. Namely looking at time management more broadly as combinations of EF skills and considering time management as an extraneous cognitive load which can be reduced through instructional practice as students learn these skills thus becoming part of the schema in their LTM. As implied in this research, most of students' time management skills are perceived to be gained outside the classroom during participation in extracurricular activities and at home. There is an opportunity to explore more purposefully teaching these skills explicitly, as well as scaffolding for struggling students, to early adolescent students at school during this time of rapid PFL brain development involved in these skills.

When comparing teachers expressed time management expectations and the strategies they perceive as successful in students (Table 22) there is a notable mismatch. Teachers are not observing in students the skills they articulated as their expectations of tracking time, planning time, following the daily schedule, subdividing tasks and estimating time. Considering the shared perceptions of teachers and students regarding low time management proficiency in many students, this points to specific skills where teacher development can be applied. A recommendation of this research is to explore developing these skills across all curriculum areas to explicitly develop and support the life skill of time management. As a starting point for developing time management curriculum, instructional practices from CLT may serve as a guide.

The key insights of this research describe a shared perception between teachers and students that time management contributes to academic success with many students not meeting teachers' expectations. Additionally, there is not a shared perception of classroom time management expectations and which skills and/or strategies are needed to be successful. It is recommended that teachers leverage the benefits of teacher-student communication which underlie topics addressed in this research such as, the communication of expectations, student time management capabilities and effective of scaffolding. Using reflection-in-action allows teachers to actively engage students to dynamically determine the supports, or lack of need of supports,

students require to management their classroom time efficiently (Schön, 1983). Using reflection-on-action allows teachers to pinpoint areas of improvement after the event to inform future actions (Rolfe, 2014; Schön, 1983). These actions may include pedagogy informed by CLT discussed in this thesis. For example, worked examples may take the form of teachers talking students through how to subdivide a larger task and estimate time for each step, making explicit what may have been implicit or tacit previously. To avoid the CLT transient effect (Leahy & Sweller, 2016), writing this information on the board allows it to be easily accessible to students throughout the task in the classroom. To help students track time, analogue clocks can be shaded in with dry erase pens showing both the time and how much time is allocated for each part of a task. This is based on CLT concepts of providing visual reminders rather than verbal (transient effect) and avoiding the split-attention effect (Garnett, 2020) by having the time and estimated completion times physically co-located. These strategies can be used by the same teacher multiple times and/or different subject area teachers providing spacing of learning over time and interleaving across content areas (EFF, 2021). Teachers have a variety of instructional practices to try in their classrooms, evaluate both by reflection-in-action and reflection-on-action, and adjust appropriately for their classes and individual students. Student time management skills benefit from a practical, pragmatic approach to addressing each student's needs.

As discussed previously (Chapter 5.6), this research has limitations common to small-scale exploratory research with the addition of being conducted during the Covid-19 pandemic. Being broad and exploratory in nature, allows for the identification of areas meriting further consideration. Future research may consider addressing such questions as: Does supporting time management skills reduce extraneous load allowing more working memory to be used for learning? If so, how to develop overall student proficiency of completing work on time (time management) in terms of strengthening EF skills? Do difficulties in time management create an extraneous load that can be reduced by the type of time tools used to track time (e.g. types of clock or timers), increasing the amount of working memory available for learning (intrinsic load)? This thesis highlights the importance and complexity of time management as a student skill. Building on this work, further research and developments in teacher practices can lead to improved student proficiency. The goal is to support the development of this life skill.

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Glossary

Term	Explanation
Attention Control Theory (ACT)	A theory which suggests that anxiety affects cognition.
Advancement Via Individual Determination (AVID)	A non-profit organization supporting student college and career readiness and success.
Attention Shifting (SH)	Part of executive function skills involved in cognitive flexibility.
Behavioural Assessment of Dysexecutive Syndrome in Children (BADS-C)	An executive function assessment tool.
Behaviour Rating Inventory of Executive Functioning (BRIEF)	An executive function assessment tool.
Common Core State Standards (CCSS)	Mathematics curriculum in the U.S.
Cognitive Load Theory (CLT)	An instructional theory with a framework of cognitive loads.
Delis Kaplin Executive Functions Scale (D-KEFS)	An executive function assessment tool.
Executive Function Index (EFI)	An executive function assessment tool.
English-Language Arts (ELA)	Term used in the U.S. for a middle school course combining English and literature.

Expectancy Value Theory (EVT)	A motivation theory where motivation is equated to expected success and reward.
Grade point average (GPA)	Numerical average of student achievement based on a four-point scale.
Inhibitory Control (IC)	Part of executive function skills including self-control, discipline and resisting distractions.
Long-term memory (LTM)	Knowledge organised in cognitive schema.
Prefrontal Cortex (PFC)	Part of the brain located behind the forehead and responsible for executive functions.
Qualitative content analysis (QCA)	A method of analysing interview transcripts.
Self-directed learning (SDL)	Student initiated and planning of own learning.
Self-determination theory (SDT)	A motivation theory examining intrinsic, extrinsic and amotivation.
Time Use Efficiency Scale (TUES)	A questionnaire research method measuring time use.
Working memory (WM)	Short-term memory involved in processing information.

APPENDIX 1 AN EXAMPLE OF THE RELATIONSHIP BETWEEN DIFFERENT QUESTION TYPES

Question Type	Guiding	Research	Interview
Example	What are teachers' perceptions of students' time management skills and strategies?	Is there a perception by teachers that time management, an executive function skill, is related to academic success?	Do you think time management is important to academic success?
		How do teachers perceive students' (ages 11-14 years) tie management proficiency?	How would you describe your students' time management skills? For those students who struggle with time management, what do you perceive is the major reason(s)?
		What classroom time management expectations are perceived by teachers?	Would you describe the time management skills expected for middle school students in your school?
		What are the skills and/or strategies students are using for time management as perceived by teachers?	What types of strategies do you perceive your students are using when completing tasks in class? Without using a name, can you describe a student with very good time management skills and one who struggles?

APPENDIX 2 COMPARISON OF U.S. AND U.K. MATHEMATICS MEASUREMENT TIME STANDARDS

Academic Level Student Age U.K. (Year, Key Stage) U.S. (Grade)	**U.K.** **Mathematics Standards**	**U.S.** **Common Core Mathematics Standards** **(CCSS)**
5-6 years Year 1, Key Stage 1 Kindergarten	Compare, describe and solve practical problems for: time [for example, quicker, slower, earlier, later]. Measure and begin to record: Time (hours, minutes, seconds) and sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]. Recognize and use language relating to dates, including days of the week, weeks, months and years Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	N/A
6-7 years Year 2, Key Stage 1 Grade 1	Compare and sequence intervals of time. Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times. Know the number of minutes in an hour and the number of hours in a day.	Tell and write time: Tell and write time in hours and half-hours using analog and digital clocks.
7-8 years	Tell and write the time from an analogue clock, including using Roman	Work with time and money: Tell and write time from analogue and digital clocks to

Year 3, Lower Key Stage 2 Grade 2	numerals from I to XII, and 12-hour and 24-hour clocks. Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight. Know the number of seconds in a minute and the number of days in each month, year and leap year. Compare durations of events [for example, to calculate the time taken by particular events or tasks].	the nearest 5 minutes, using a.m. and p.m.
8-9 years Year 4, Lower Key Stage 2 Grade 3	Read, write and convert time between analogue and digital 12- and 24-hour clocks. Solve problems involving converting from hours to minutes, minutes to seconds, years to months, weeks to days.	Solving problems involving measurements and estimations: Tell and write time to the nearest minute and measure time internals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes.
9-10 years Year 5, Upper Key Stage 2 Grade 4	Solve problems involving converting between units of time.	N/A

Sources:

UK National Curriculum: Available at: https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study/national-curriculum-in-england-mathematics-programmes-of-study#key-stage-1---years-1-and-2

US – CCSS Mathematics Measurement & Data Domain descriptions: Available at: http://www.corestandards.org/Math/Content/MD/

APPENDIX 3 PILOT STUDY QUESTIONNAIRE

The pilot study used SurveyMonkey as a platform.

Dear Teacher,

My name is Alison Seymour, an EdD research student in the Department of Education at the University of Winchester, UK. You are invited to take part in the following research survey for educators who teach students between the ages of 11-14 years. This project seeks to add to our understanding of student time management skills and their use of clocks. You are a valuable component of this research in contributing your observations. Your participation is very much appreciated.

It is anticipated that this questionnaire will take less than 10 minutes to complete.

What is the purpose of this survey?

This survey aims to collect information regarding the prevalence and use of analogue and digital clocks in classrooms by students ages 11-14 years old.

What does the questionnaire entail?

This questionnaire will ask you about your personal knowledge and perceptions about clocks in your classroom and observations of students regarding time management. For this survey, time management is defined as students using time efficiently to complete assignments within the teacher specified length of time.

All of the data collected for this study will be anonymous. You will not be asked for your name or any other identifying information. The data will be stored in a password-protected file and will only be accessible to the researcher and university advisors involved in this project. The anonymous data may be used in presentations (online and in person), research reports, and thesis project. In addition, the anonymous data may be used for further analysis. Your individual data will not be identifiable; however if you do not want the data to be used in these ways, please do not complete the questionnaire.

If you do agree to complete the questionnaire you are free to leave any questions unanswered or to stop completing the questionnaire altogether at any point. Once the questionnaire is submitted, the data cannot be withdrawn, as it is anonymous so there will be no way to identify specific data. The data will be kept for no longer than 5 years after which point it will be destroyed.

The University of Winchester Ethics Committee has approved this research. If you have any questions or complaints about this research please contact me at a.seymour1.19@unimail.winchester.ac.uk or the Ethics Committee.

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

Thank you for your participation. If you are interested in learning more about this research or participating in future aspects of this study, please contact me directly at a.seymour1.19@unimail.winchester.co.uk.

OK

* 1. **Participation by clicking the "yes" button and completing this questionnaire will be taken as confirmation of informed consent. If you do not wish to participate, click the "no" button.**

◯ Yes

◯ No

2. Are any of your students aged 11-14 years old (inclusive)?

◯ Yes

◯ No

3. Where geographically do you teach? Please provide a city and country. In the USA, please provide a city and state.

City	
Country	
If in the USA, please provide your state.	

4. Which subject(s) do you teach? You may select more than one.

- [ ] English/Literature
- [ ] Foreign Language
- [ ] History/Social Studies/Geography
- [ ] Mathematics
- [ ] Physical Education
- [ ] Science
- [ ] Other

5. Do you have a clock(s) visible to students in your classroom?

If you are currently teaching remotely due to Covid-19, please provide information for your normal classroom or a typical classroom at your school.

- ◯ Yes
- ◯ No

6. How many of each type of clock do you have visible to students in your classroom?

If you teach in multiple rooms, please choose the one that is most typical of your school.

Type 0, if none present.

Total number of analogue clocks

Total number of digital clocks

7. Have you had students who indicate that they cannot read an analogue clock?

- ◯ Yes
- ◯ No

8. From your experience, estimate what percentage of your students cannot read an analogue clock.

- ◯ 1-20
- ◯ 21-40
- ◯ 41-60
- ◯ 61-80
- ◯ 81-100

9. How often do you have students asking you what time it is?

- ◯ Very often (Several times a day)
- ◯ Often (Once or twice a day)
- ◯ Sometimes (Once or twice a week)
- ◯ Rarely (Every couple of weeks)
- ◯ Never

10. How often do you refer to time when you assign a task in class?

- ◯ Very often (Several times a day)
- ◯ Often (Once or twice a day)
- ◯ Sometimes (Once or twice a week)
- ◯ Rarely (Every couple of weeks)
- ◯ Never

11. How often do you perceive students referring to a clock during an assignment including watches and cell phones?

- ◯ Very often (Several times a day)
- ◯ Often (Once or twice a day)
- ◯ Sometimes (Once or twice a week)
- ◯ Rarely (Every couple of weeks)
- ◯ Never

12. How often do you perceive students having problems using time effectively to complete tasks in class?

- ◯ Very often (Several times a day)
- ◯ Often (Once or twice a day)
- ◯ Sometimes (Once or twice a week)
- ◯ Rarely (Every couple of weeks)
- ◯ Never

13. Based on your teaching experience, do you have a preference for students using either an analogue or digital clock?

- ◯ Yes
- ◯ No

14. Do you prefer students to use an analogue or digital clock?

- ◯ An analogue clock
- ◯ A digital clock

15. Please explain why you prefer that students use an analogue clock.

16. Briefly relate an experience you have observed of a student having time management difficulties in your class. How did understanding the passage of time and/or use of a clock contribute positively or negatively? Please do not use names, but rather use he/she/they.

Time management is defined, for this survey, as students using time efficiently to complete assignments within the teacher specified length of time.

17. Were there any questions in this survey that you felt it was unclear how to answer?

- ◯ Yes
- ◯ No

18. Please explain which question(s) was unclear how to answer and why.

19. Thank you for your participation. This research study would like to include as wide a range of teachers as possible. It would be much appreciated if you would contact colleagues who may also be interested in participating. You can cut/paste the link below and include in an email. Please blind copy (bcc) potential participants.

https://www.surveymonkey.co.uk/r/V6MYDJV

Again, thank you for your participation and if you are interested in additional information or in participating in the future, please contact me at a.seymour1.19@unimail.winchester.ac.uk.

Alison Seymour

APPENDIX 4 STUDY INFORMATION SHEETS FOR TEACHERS AND STUDENTS

PARTICIPANT INFORMATION SHEET

Exploring Students' Executive Functioning Time Management (EF-TM) Skills in the Classroom

Researcher: Alison Seymour, a.seymour1.19@unimail.winchester.ac.uk

Dear Teacher Participant,

This is an invitation to take part in a research study as a teacher of students between the ages of 11-14 years. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully and take time to decide whether you wish to participate. If there is anything that is unclear, or if you would like more information, please feel free to contact me at the email above. Your consideration to participate is much appreciated.

Who is doing the research?

My name is Alison Seymour, an EdD research student in the Department of Education at University of Winchester, UK. This research will be used in a doctoral thesis and subsequent publications. I am also a credentialed teacher in California (https://www.ctc.ca.gov/commission/lookup).

What is the purpose of this research?

This research seeks to explore perceptions of teachers and students, between the ages of 11-14 years, regarding student executive time management skills within the classroom. For the purposes of this research, time management is defined as students using time efficiently to complete assignments within the teacher specified length of time. The prevalence and use of clocks within the classroom will also be included.

Why have I been invited?

You have been invited to take part because you are a teacher of students aged 11-14 years with experience in the classroom.

Do I have to take part?

Participation is entirely voluntary; it is up to you to decide whether to take part. Once you have read this information sheet and, if you choose to continue, you will be asked to complete a consent form. Participation is in the form of an online interview and if you change your mind at any point during

the study, you can stop taking part by ending the Microsoft Teams session. If, after taking part, you decide that you not want your data to be used in the study, you can contact the researcher using the email address on this information sheet, within 2 weeks of taking part. You do not need to give a reason for withdrawing.

What does the interview entail?

The interview will be conducted on Microsoft Teams at a mutually convenient time with the researcher. You will be asked about your personal knowledge and perceptions regarding students' time management and clocks within your classroom based on your teaching experience. You may decline to answer any question or portion of a question. The interview is anticipated to take between 30-60 minutes and will be recorded.

How will my data and my privacy be handled within this study?

The data collected will be on the University platform (OneDrive) and encrypted. Data will only be available to the researcher and supervisory team. Taping of the interview and associated correspondence will be stored on the University of Winchester system. Within the final report, no names, schools, email or identifying contact information will be included. Teachers will be given an identifier, such as Teacher TA. The anonymous data may be used in presentations (online and in person), research reports and thesis project. Interview recordings will be deleted within three years of collection. Your individual data will not be identifiable, however, if you do not want your interview to be used in these ways, please decline from participating.

What are the possible risks of taking part?

There are no known risks of taking part in this research. The topic area is not sensitive, and questions are designed to be neutral in tone. However, should you find yourself upset or worried by any of the questions or the issues they raise, you may end the interview at any point. If you are concerned about your health in anyway, you should contact your doctor.

What are the possible benefits of taking part?

The results of this study will help us to understand the how students use their time when completing tasks in class. If you are interested in the results, please contact me and I will be happy to provide them once completed. Additionally, a $5 Amazon gift card will be provided as a thank you for your time.

What if I have concerns or a complaint?

If you have a concern or complaint about how this research has been conducted, please contact the university's ethics committee at ethics1@winchester.ac.uk

Who can I contact for further information?

For further information about the research, please contact me at a.seymour1.19@unimail.winchester.ca.uk

Thank you for taking the time to read this information and your interest in this research.

UNIVERSITY OF WINCHESTER

PARTICIPANT INFORMATION SHEET

Exploring Students' Executive Functioning Time Management (EF-TM) Skills in the Classroom

Researcher: Alison Seymour, a.seymour1.19@unimail.winchester.ac.uk

Dear Parent of Student Participant,

This is an invitation for your child to take part in a research study as a student between the ages of 11-14 years. Before you decide on your child's participation, it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully and take time to decide whether you wish your child to participate. If there is anything that is unclear, or if you would like more information, please feel free to contact me at the email above. Your consideration is much appreciated.

Who is doing the research?

My name is Alison Seymour, an EdD research student in the Department of Education at University of Winchester, UK. This research will be used in a doctoral thesis and subsequent publications. I am also a credentialed teacher in California (https://www.ctc.ca.gov/commission/lookup).

What is the purpose of this research?

This research seeks to explore perceptions of teachers and students, between the ages of 11-14 years, regarding student executive time management skills within the classroom. For the purposes of this research, time management is defined as students using time efficiently to complete assignments within the teacher specified length of time. The prevalence and use of clocks within the classroom will also be included.

Why has my child been invited?

Your child has been invited to take part as a student aged 11-14 years with experience of being in a classroom.

Does my child have to take part?

Participation is entirely voluntary; it is up to you and your child to decide whether to participate. You are encouraged to discuss this with your child prior to signing the consent form and your child receiving their own Information Sheet. Once you have read this information sheet and, if you choose to continue, you will be asked to complete a consent form for your child. Your child will also need to sign a consent form to participate. Participation is in the form of an online interview and if you change your mind at any point during the study, you can stop taking part by ending the Microsoft Teams session. If, after taking part, you decide that you not want the data to be used in

the study, you can contact the researcher using the email address on this information sheet, within 2 weeks of taking part. You or your child does not need to give a reason for withdrawing.

What does the interview entail?

The interview will be conducted on Microsoft Teams at a mutually convenient time with the researcher. Your child will be asked about how they use and think about time for their time management in completing tasks, and clocks within the classroom based on their experiences. Participants may decline to answer any question or portion of a question. The interview is anticipated to take between 30-60 minutes and will be recorded.

How will data and privacy be handled within this study?

The data collected will be on the University platform (OneDrive) and encrypted. Data will only available to the researcher and supervisory team. Taping of the interviews and associated correspondence will be stored on the University of Winchester system. Within the final report, no names, schools, email or identifying contact information will be included. Students will be given an identifier, such as Student 1. The anonymous data may be used in presentations (online and in person), research reports and thesis project. Interview recordings will be deleted within three years of collection. Individual data will not be identifiable, however, if you do not want the interview to be used in these ways, please decline from having your child participate.

What are the possible risks of taking part?

There are no known risks of taking part in this research. The topic area is not sensitive, and questions are designed to be neutral in tone. However, should you find yourself or child upset or worried by any of the questions or the issues they raise, you may end the interview at any point. If you are concerned about your or your child's health in anyway, you should contact your doctor.

What are the possible benefits of taking part?

The results of this study will help us to understand the how students use their time when completing tasks in class. If you are interested in the results, please contact me and I will be happy to provide them once completed. Additionally, a $5 Amazon gift card will be provided for your child as a thank you for their time.

What if I have concerns or a complaint?

If you have a concern or complaint about how this research has been conducted, please contact the university's ethics committee at ethics1@winchester.ac.uk

Who can I contact for further information?

For further information about the research, please contact me at a.seymour1.19@unimail.winchester.ca.uk

Thank you for taking the time to read this information and your interest in this research.

UNIVERSITY OF WINCHESTER

PARTICIPANT INFORMATION SHEET

Exploring Students' Executive Functioning Time Management (EF-TM) Skills in the Classroom

Researcher: Alison Seymour, a.seymour1.19@unimail.winchester.ac.uk

Dear Student Participant,

This is an invitation to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully, speak to a parent and take time to decide whether you want to participate. If there is anything that is unclear, or if you would like more information, please feel free to have your parent contact me at the email above. Your willingness to participate is much appreciated.

Who am I?

My name is Alison Seymour, an EdD research student in the Department of Education at University of Winchester, UK. In order to get a doctorate degree, you need to conduct a research study. You are being invited to participate in my study. I have also been a middle school science teacher in California.

What is this research?

This research is exploring how teachers and students think about time management skills in class. Time management is defined as students using time efficiently to complete assignments within the teacher specified length of time. It also looks at how we use clocks.

Why have I been invited?

You have been invited to take part because you are a student aged between 11-14 years with experience in the classroom.

Do I have to take part?

No, it's up to you. Participation is entirely voluntary. Once you have read this information sheet and, if you want to participate, you will be asked to complete a consent form. Your parents will also fill out a consent form. Then, an online interview will be set up. You can change your mind at any point during the study including ending the interview. If, after taking part, you decide that you not want your data to be used in the study, your parents can contact me using the email address on this information sheet, within 2 weeks of taking part. You do not need to give a reason for withdrawing.

What will I have to do?

You will be interviewed using Microsoft Teams. You will be asked about what you think and do in getting work done in class. We will also talk about clocks. It will be a conversation between you and me. There are no right or wrong answers, the research is interested in your perception, what you

think. You may decline to answer any question or part of a question. The interview will take between 30-60 minutes and will be recorded.

How will my data and my privacy be handled within this study?

Your interview will be stored on the University computer system. In the final report, no names, schools, email or identifying contact information will be included. You will be given an identifier, such as Student 1. The anonymous data may be used in presentations (online and in person), research reports and thesis project. Interview recordings will be deleted within three years. Your individual data will not be identifiable, however, if you do not want your interview to be used in these ways, please decline from participating.

What are the possible risks of taking part?

There are no known risks of taking part in this research. The topic area is not sensitive, and questions are designed to neutral in tone. However, should you find yourself upset or worried by any of the questions or the issues they raise, you may end the interview at any point. If you are concerned about your health in anyway, you should speak to a parent who may wish to contact your doctor.

What are the possible benefits of taking part?

The results of this study will help us to understand the how students use their time when completing tasks in class. If you are interested in the results, your parent can contact me and I will be happy to provide them once completed. Additionally, a $5 Amazon gift card will be provided as a thank you for your time.

What if I have concerns or a complaint?

If you have a concern or complaint about how this research has been conducted, your parent may contact the university's ethics committee at ethics1@winchester.ac.uk

Who can I email to find out more?

To find out more about the research, please contact me at a.seymour1.19@unimail.winchester.ca.uk

Thank you for taking the time to read this information and your interest in this research.

UNIVERSITY OF WINCHESTER

Debrief Information Sheet

Exploring Students' Executive Functioning Time Management (EF-TM) Skills in the Classroom

Thank you for taking part in this study.

As stated in the Information Sheet, the purpose of this research is to gain understanding of the perceptions of students' classroom time management skills and use of clocks as tools. Your participation is important and very appreciated.

If you (or your child, for student participants) have experienced any form of emotional discomfort as a result of this study, please get in touch with your local support services.

If you decide that you (or your child, for student participants) no longer want the interview data to be used in this study, you have up to two weeks to withdraw the data. If this is the case, please email a.seymour1.19@unimail.winchester.ac.uk. You do not need to give a reason for withdrawing.

If you wish to make a complaint about the way the study was conducted, please contact RKE Chair of University Ethics: Dr Samantha Scallan: ethics1@winchester.ac.uk

If you wish to make a complaint about how your data has been handled in the study, please contact: Stephen Dowell, Data Protection Officer, The University of Winchester, Sparkford Road, Winchester, Hampshire, SO22 4NR. United Kingdom. Tel +44 (0) 1962 847217. Email: Stephen.Dowell@winchester.ac.uk

Thank you for your participation. If you have any further questions about this study, please feel free to email me (Alison Seymour) at a.seymour1.19@unimail.winchester.ac.uk

APPENDIX 5 ETHICS CONSENT FORM

The consent form was made available through Microsoft Forms on the University of Winchester system.

Participant Consent Form

Exploring Students' Executive Functioning Time Management (EF-TM) Skills in the Classroom

Dear Participant or Parent of a Participant,

After reading the Participant Information Sheet provided in your invitation email, please respond to the following questions to confirm your consent to participate in this study, or for your child to participate.

If you have any questions or concerns, you may contact me at a.seymour1.19@unimail.winchester.ac.uk.

Thank you,

Alison Seymour
EdD Research Student
University of Winchester, UK
a.seymour1.19@unimail.winchester.ac.uk

* Required

1. First Name *

Enter your answer

2. Last Name

Enter your answer

3. Child Participant's Name (if applicable)

Enter your answer

4. Today's Date (Month/Day/Year Format) *

Please input date (M/d/yyyy)

5. Preferred Email Address (This will be the email address used for the MS Teams Interview) *

Enter your answer

6. I have read and understand the information presented in the Participant Information Sheet. I have had the opportunity to discuss it with the researcher and to ask any questions. I understand that (Please tick each box):

Participation is entirely voluntary. *

- ◯ Yes

7. Participants are free to refuse to answer any question(s). *

- ◯ Yes

8. Participants are free to withdraw from the research during or within two weeks of participating – See the Participant information Sheet for Further details on how to withdraw. Parents may withdraw data on behalf of their child. *

- ◯ Yes

9. Participant's data will be collected, stored and processed as described in the Participant information Sheet. *

- ◯ Yes

10. Participants will not be named or identifiable in any output resulting from this study. *

- ◯ Yes

11. Participation will be a recorded interview on Microsoft Teams. *

- ◯ Yes

12. On these bases, I agree to take part (or I agree for my child to take part) in the above-named project and give my permission for the collected data to be used for research and publication purposes.

- ◯ I consent to take part in this research.
- ◯ I consent for my child to take part in this research. (If applicable)
- ◯ I do not consent to take part in this research.

Thank You

Thank you for participating in this research project. You will be contacted soon to set up a day/time for the interview.

Thank you for considering this project.

You can print a copy of your answer after you submit

Back Submit

APPENDIX 6 TEACHER AND STUDENT INTERVIEW PROMPT SHEETS

Teacher Interview Prompts

Introduction:

Thank you for agreeing to participate. I would like to start recording now and begin with a review of the consent form.

Start recording ☐

Thank you for agreeing to participate and filling out the Consent form prior to this interview. ☐

As a reminder: This is being recorded. ☐

You may skip questions or stop the interview at any point. ☐

Within the final reports or presentations, no names will be used. ☐

You have 2 weeks to withdraw your data if you no longer wish to participate. ☐

Great. The interview has two parts, the first one is more structured, and the second part has more open questions. The interview will last about 30-60 minutes. ☐

I will be asking you about your perceptions of students' time management skills and strategies in your classroom from your teaching experiences, which may include this year or prior years. ☐

Questions:

1. This first, to confirm your eligibility. Do you teach students between the ages of 11-14 years? ☐

2. In which state do you teach? ☐ Would you describe your school? Large, small? Public or private? Any distinguishing features? ☐ Would you describe your classroom? Size of classes, types of desks, set up? ☐

3. What grades and subjects do you teach or have taught? ☐

4. How long have you taught this age group? ☐

For the next series of questions, I would like you to rate them on a scale from Very Often to Never. I will put the scale up on a shared screen. It may take me a moment.

Very often (daily)
Often (Several times a week)
Sometimes (Once or twice a week)
Rarely (Every couple of weeks)
Never

5. How often do you have students asking you what time it is? ☐

6. How often do you refer to time when you assign a task in class? ☐

7. How often do you perceive students referring to a clock during an assignment including watches, or cell phones? ☐

8. How often to you perceive students having problems using time effectively in class? ☐

Going back to clocks.

9. Do you have any clocks visible to students in your classroom? If so, how many, what kind and where? Did you have a choice or were they provided by the school? If provided, would like something different? ☐

10. Do you have students who indicate that they cannot read an analogue clock? If so, about what percentage? ☐

11. Do you have a preference between using analogue or digital clocks with students? If so, why and how do you use them? ☐

These next questions are more open ended.

12. Do you remember a time when you couldn't tell time? ☐ For your own use, do you personally have a preference between analogue or digital clocks/watches? Explain. ☐

13. Do you think your perception of time is the same as your students? ☐

I will be referring to student time management. For these questions, I am defining time management as students using time efficiently to complete assignments within your teacher specified length of time. ☐

14. How would you describe your students' time management skills, in general? ☐

15. For those students who struggle with time management, what do you perceive is the major reason(s)? ☐

Would you give some examples of what you observe? ☐

16. What types of strategies do you perceive your students are using when completing tasks in class? ☐

17. Without names, can you describe a student with very good time management skills and one who struggles? ☐

18. Would you describe the time management skills expected for middle school students in your school. ☐

19. Do you explicitly build time management strategies into your lesson planning or instruction? ☐

20. How important do you think tracking time is for student time management? ☐

21. There is evidence that many of our students in the US can no longer read analogue clocks. Do you think analogue clock reading should be retained in the elementary math curriculum? Why or why not? ☐

Is there anything you would like to add? Did you find any question in this survey that you felt uncertain about the wording or what was being asked? If so, which ones and let's go back to that question for clarification. ☐

Thank you for your participation. As a thank you, you will be receiving a $5 Amazon gift card which will be sent via email before the end of the month. If you have any questions or concerns, you are welcome to contact me by email. Thank you again. ☐

Turn off recording. ☐

Student Interview Prompts

Introduction:

Thank you for agreeing to participate in my research. I would like to start recording and then begin with talking about the Consent Form. ☐

Start recording. ☐

Did you read through the Information From? ☐

As a reminder: You may skip any questions or stop the interview at any time. ☐

In the reports, there will be no names or schools mentioned. ☐

If you don't want your interview used, you have 2 weeks for a parent to email me and let me know. ☐

Okay? ☐

I will be asking you about what you do in class to finish assignments on time. ☐

Also, there are no right or wrong answers. This research is to better understand time management of students from a student point of view. Only you can describe what you are thinking. ☐

Questions:

1. How old are you? ☐ What grade are you in? ☐
2. In which state do you go to school? ☐
3. This year, with Covid, have you been mostly in school or working from home? ☐
4. Would you describe your school? ☐ Can you describe one of your classrooms? How many students, what it looks or feels like? ☐

For the next series of questions, I would like you to rate them on a scale from Very Often to Never. I have the scale up on the shared screen.

Very often (daily)
Often (Several times a week)
Sometimes (Once or twice a week)
Rarely (Every couple of weeks)
Never

5. How often do think you ask a teacher what time it is during class? ☐
6. How often do you think your teacher refers to time during class? This could be saying something like, "You have 20 minutes to get this done" or "We need to be done by 2:30." ☐

7. How often do you think you look to see what time it in class? ☐

8. Where do you look? For example, a wall clock, your cell phone, etc. ☐

9. Why do you think you check? ☐

10. How often to you feel like you are struggling or rushing to get assignments completed on-time? ☐ We'll come back to this later because I would like to understand more about this.

Going back to clocks.

11: Do you remember a time when you couldn't tell time? ☐ Do you remember learning about clocks and time? ☐

12. Do you think teachers and students think about time the same way? Explain. ☐

13. Do you have any clocks visible to you in your classroom? If so, how many, what kind and where? ☐

14. Do you feel like you can read an analogue clock? ☐

15. Can I show you a few clock faces and have you tell me the time? (Use shared screen). What I will be asking you is how, in your mind, you figure out the time. ☐

Analogue Clock _____ +30 min _____☐

Digital Clock _____ +30 min _____☐ Describe how you figured that out in your brain? ☐

16. Which type of clock do you like better? Why? ☐

For the next few questions, I will be referring to time management. For these questions, I am talking about time management as students using time efficiently to complete assignments within your teacher's specified length of time.

17. How to you think you do at managing your time in class? ☐

18. What types of strategies do you use when getting assignments done in class? Strategies meaning what do you do or think about to help you get things done? For example: You have a science lab to do have lots of steps to do, like read the lab, set up a data table, do the experiment and draw a graph, and the teacher says you have 40 minutes. What do you do? ☐

19. Is it different for different subjects? What if your English teacher wants you to write a 5-paragraph essay and you have an hour? ☐

20. If you are having a hard time getting your work done on time, what do you think is the major reason why? Or is there more than one reason? ☐

21. Do you think teachers should help students with time management? ☐ How? Do you have any ideas? ☐

22.There is evidence that many students and adults in the US can no longer read analogue clocks. Do you think analogue clock reading should be taught in elementary school? Why or why not? ☐

23. Did you find any question in this survey that you felt uncertain about the wording or what was being asked? If so, which ones and let's go back to that question for clarification. ☐

Thank you so much. I really appreciate it. $5 Amazon gift card will be coming. If you have any questions, your parent can email me. That's it.

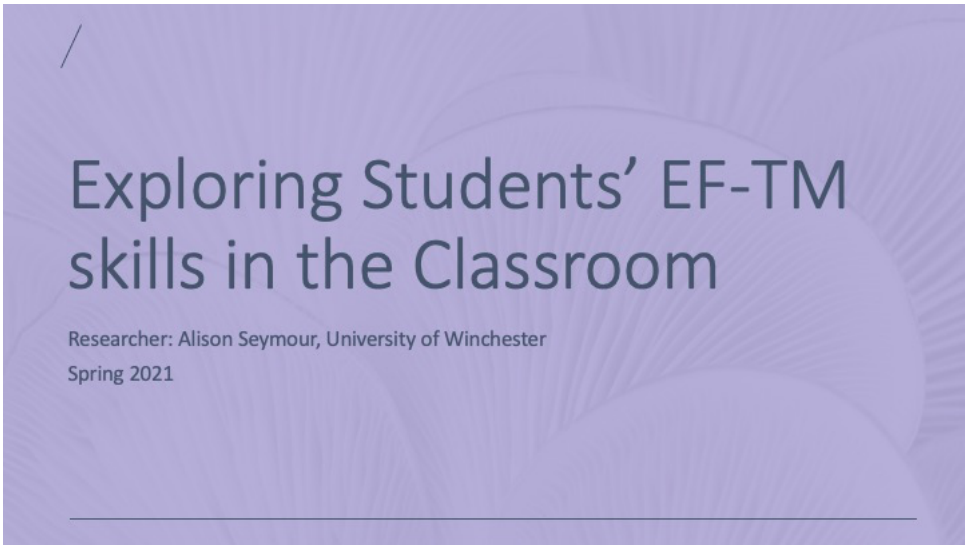
Turn off recording. ☐

APPENDIX 7 POWERPOINT PROMPTS USED IN TEACHER AND STUDENT INTERVIEWS

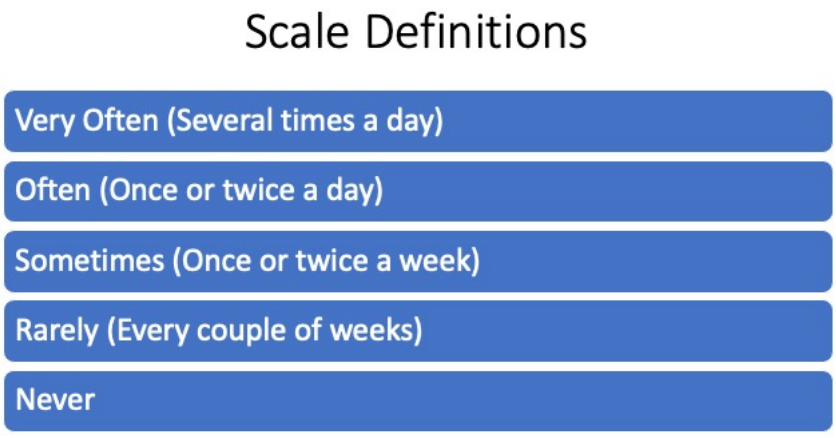
A PowerPoint presentation was used for the Likert scale for both teachers and students. The analogue and digital clock faces were part of the student interview only.

Slide 1: Cover Slide

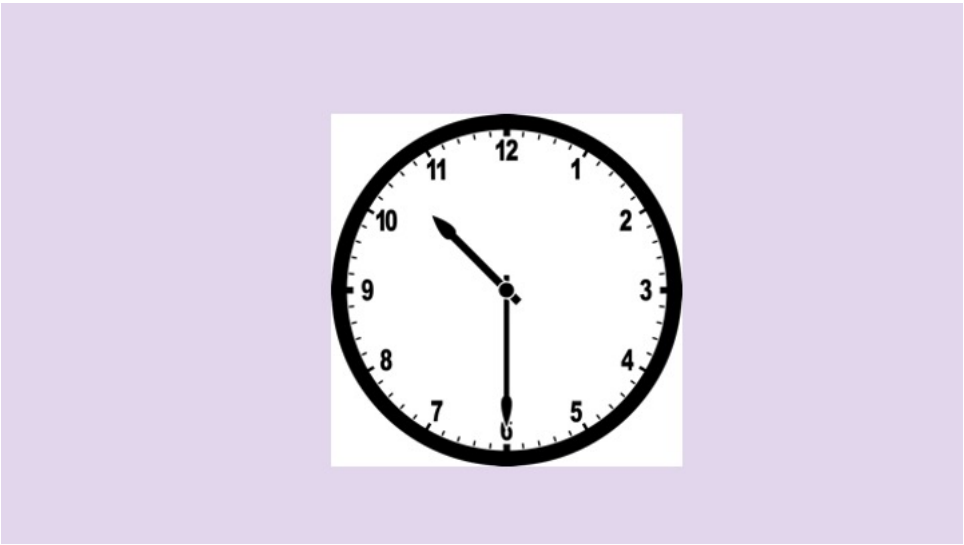
Note: Executive Function – Time Management was a term used early in the research process to indicate viewing time management in terms of executive function skills.



Slide 2: Used in interviews for both teachers and students for the four Likert questions.



Slide 3: Used for student interviews for students to indicate the current time and thirty minutes past this time.



Slide 4: Used for student interviews for students to indicate the current time and thirty minutes past this time.

Slide 5: Used for student interviews for students to indicate the current time and thirty minutes past this time.

Slide 6: Used for student interviews for students to indicate the current time and thirty minutes past this time.

Image of the analogue clocks: https://etx.usf.edu/clipart33700/33746/nclock-02-32_33746.htm.

APPENDIX 8 INTERVIEW CODING MATRIX

Segment	Category	Code
S1 Teachers' perception of students' time management proficiency	S1C1 Perceived Effectiveness of Time management Student Skills	S1C1.1 In general, very good S1C1.2 In general, good S1C1.3 In general, not good S1C1.4 Made a distinction between groups S1C1.5 Laughed when responding
	S1C2 Perceptions of struggles in time management skills	S1C2.1 Lack of perception of time/Internal clock S1C2.2 Tracking time/Too long on one item/Working slow S1C2.3 Procrastination/Laziness S1C2.4 Don't want to ask for help/Embarrassed S1C2.5 Lack of self-regulate/Focus S1C2.6 Distracted/Socializing S1C2.7 Lack of maturity S1C2.8 Lack of prioritization S1C2.9 Trouble reading a clock S1C2.10 Don't Understand (what is needed/said) S1C2.11 Trouble with task initiation S1C2.12 Lack of organization/Just work S1C2.13 Rushing
	S1C3 Perceived time management expectations	S1C3.1 Good notetaking S1C3.2 Complete tasks on time S1C3.3 Planning time S1C3.4 Tracking time S1C3.5 Self-regulation/Focus

		S1C3.6 Self-motivation S1C3.7 Follow daily schedule S1C3.8 Subdivide tasks S1C3.9 Estimate time S1C3.10 Manage time S1C3.11 Enough sleep (Prepared for class) S1C3.12 Respectful/Mature behaviour
S2 Successful student Time Management Strategies	S2C1 Teachers' perceptions of student time management strategies	S2C1.1 Skipping around questions S2C1.2 Notetaking skills S2C1.3 Follow a plan/agenda/calendar S2C1.4 Motivated/No excuses S2C1.5 Overall, academically strong S2C1.6 Asks questions/Self-advocates S2C1.7 Sets goals/Prioritization S2C1.8 Detail Oriented S2C1.9 Track time
	S2C2 Students' perceptions of their own time management strategies	S2C2.1 Skipping around questions S2C2.2 Not procrastinating/Focused (not distracted) S2C2.3 Organize tasks S2C2.4 Track time/Time monitoring/Estimate time S2C2.5 Just start and/or work fast/No time to plan S2C2.6 Work toward a goal/reward S2C2.7 Asking questions (clarification from teacher/student) S2C2.8 Checklist/Agenda/Planner S2C2.9 Take breaks

S3 Students' perceptions of their own time management (self-assessed)	S3C1 Effectiveness of their time management	S3C1.1 Very good S3C1.2 Good S3C1.3 Not good S3C1.4 Depends
	S3C2 Perceptions of struggles in time management skills	S3C2.1 Tracking time/Too long on one item/Working slow S3C2.2 Procrastination/Laziness S3C2.3 Lack of self-regulate/Focus S3C2.4 Distracted/Socializing S3C2.5 Trouble reading a clock S3C2.6 Don't Understand (what is needed/said) S3C2.7 Trouble with task initiation S3C2.8 Lack of organization/Just work S3C2.9 Rushing S3C2.10 Lack of interest
	S3C3 Perceived time management skill expectations	S3C3.1 Complete tasks on time S3C3.2 Planning time S3C3.3 Tracking time S3C3.4 Self-regulation/Focus S3C3.5 Self-motivation S3C3.6 Subdivide tasks S3C3.7 Enough sleep (Prepared for class) S3C3.8 Ask for help when needed S3C3.9 Work as fast as possible S3C3.10 Well done/Done neatly S3C3.11 Do your best (sincere
S4 Time tools useful for student time management in the classroom	S4C1 General Comments	S4C1.1 Pass the time/Class over S4C1.2 How much time is left S4C1.3 When Anxious/Stressed

	S4C2 Analogue Clocks	S4C2.1 Visual representation/Spatial S4C2.2 "About" Time/Approximate time S4C2.3 Passage of time S4C2.4 More difficult
	S4C3 Digital Clocks	S4C3.1 Faster S4C3.2 Easier S4C3.3 More convenient/Chromebook et al. S4C3.4 More exact/Precise
	S4C4 Timers/Countdown Timers	S4C4.1 Visual S4C4.2 Useful when a limited amount of time S4C4.3 Useful when time is critical/"Do Now" S4C4.4 Motivation S4C4.5 For games
S5 Preference between analogue and digital clock use	S5C1 Prevalence of a Preference	S5C1.1 No Preference S5C1.2 Analogue clock preference S5C1.3 Digital clock preference S5C1.4 Depends on the situation
	S5C2 Reasons Analogue Clocks Preferred	S5C2.1 More Prevalent S5C2.2 Will Always Be Around S5C2.3 Life Skill S5C2.4 Visual S5C2.5 Passage of time S5C2.6 Develop maths skills
	S5C3 Reasons Digital Clock Preferred	S5C3.1 More Prevalent S5C3.2 Easier S5C3.3 Faster S5C3.4 More precise

		S5C3.5 Students can't read analogue clocks
	Additional Question	
S6 Where do students learn their time management skills	S6C1 Formal Education	S6C1.1 School S6C1.2 Tutors
	S6C2 Informal Education	S6C2.1 Family/Home S6C2.2 Extracurricular Activities S6C2.3 Naturally/Subconsciously S6C2.4 Trial and Error
S7 Analogue clock curriculum in primary grades	S7C1 Opinion for continuation/discontinuation of standards	S7C1.1 Yes S7C1.2 No S7C1.3 Uncertain
	S7C2 Reasons for continuation/discontinuation of standards	S7C2.1 Life Skill S7C2.2 They are still around S7C2.3 Support other skills S7C2.4 Passage of time S7C2.5 Good Visual/Spatial S7C2.6 Time management
S8 Experience learning about time	S8C1 Remembered	S8C1.1 Clock with hands S8C1.2 Worksheet S8C1.3 Easy S8C1.4 Hard/Annoying S8C1.5 Came naturally S8C1.6 First/Second Grade mentioned S8C1.7 Skip by 5s S8C1.8 Confused with learning about shapes
	S8C2 Does not remember	S8C2.1 Comments

S9 Metacognition of telling time	S9C1 Analogue clocks	S9C1.1 Visual/Spatial S9C1.2 Skip Counting (specifically) S9C1.3 Mental mathematics (generally) (+-x) S9C1.4 Movement of the hands S9C1.5 Mnemonic
	S9C2 Digital clocks	S9C2.1 Read the numbers S9C2.2 Mental Mathematics (generally)(+-x) S9C2.3 24-hour (Military time) S9C2.4 Counting (skip and/or fingers) S9C2.5 Spatial
S10 Perception of time	S10C1 Similar for both teachers and students	S10C1.1 Maturity S10C1.2 Use same tools (ex. Cell phones) S10C1.3 Same (general comment) S10C1.4 Learned the same way
	S10C2 Different for teachers and students	S10C2.1 Students (next class) v. Teachers (tasks to do) S10C2.2 No concept of time (students) S10C2.3 Urgency S10C2.4 Depends on the situation S10C2.5 Experience S10C2.6 Depends on the person
	Don't Know	S10C3.1 Asked to skip question
S11 Instances of time management pedagogy	S11C1 Explicitly taught	S11C1.1 No S11C1.2 In class (a specific example) S11C1.3 As part of distance learning (Covid)
	S11C2 Implicitly taught	S11C2.1 Lesson planning S11C2.2 Modeling by teacher/Examples S11C2.3 Time reminders

		S11C2.4 Homework assignment board S11C2.5 Perceived frustrated teacher
	S11C3 Not Taught and/or Shouldn't be taught	S11C3.1 States that it is not taught S11C3.2 Students should do on their own
S12 Interesting comment that does not fit within a category	S12C1 Personal experience/Situation	S12C1.1 AVID Experience S12C1.2 Young son learning to tell time S12C1.3 Time management or EF proposed to be taught next year
	S12C2 Comments related to negative emotions	S12C1.2 Anxiety S12C2.2 Embarrassment
	S12C3 Misc.	S12C3.1 Large v. short term assignments/projects